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ABSTRACT

This computer-assisted curriculum is intended to be used to enhance a vocational mathematics/applied mathematics course. A total of 32 packets were produced to increase the basic mathematics skills of students in the following vocational programs: automotive trades, beauty culture, building trades, climate control, electrical trades, medical/dental technology, and recreational vehicles. Designed to be used one day each week, the curriculum requires each student to be at a computer. Students complete a diagnostic skills inventory, and then are assigned to the appropriate unit. Topics include: computation with decimals, rounding numbers, fractions, percents, metric measurement, perimeter, area, volume, equations, formulas, ratio and proportion, graphing, and computer programming. Each unit contains the program printout for tutorials as well as other lesson materials, such as problems to be worked. The appendix presents the Trouble Shooting Manual to assist educators in implementing the curriculum. Both computer programming and instructional notes are included. (MNS)

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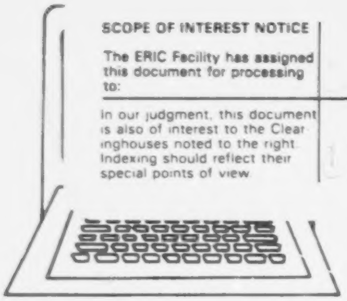

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COMPUTER ASSISTED VOCATIONAL MATH

WRITTEN FOR
TRS-80, MODEL I
LEVEL II, 16K

Automotive Trades
Beauty Culture
Building Trades
Climate Control
Electrical Trades
Medical/Dental Technology
Recreational Vehicles

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Judith Daly, Monica McAllister
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THE STATE UNIVERSITY OF NEW JERSEY
RUTGERS
Campus at New Brunswick

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NEW JERSEY VOCATIONAL-TECHNICAL CURRICULUM LABORATORY

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COMPUTER ASSISTED VOCATIONAL MATH

WRITTEN FOR
TRS-80, MODEL I, LEVEL II, 16K

WRITTEN BY

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FORWARD

In order to implement the Computer Assisted Vocational Math curriculum, a basic understanding of its development is necessary. Over a period of one week, traditional teaching methods were employed for four of the five class periods. The fifth class was devoted to instruction via the microcomputer. The textbook, Career Mathematics: Industry and Trades (Lyng et al., Houghton Mifflin, 1974) was the primary textbook used although any vocational mathematics textbook or general mathematics textbook could be used to supplement the curriculum. The Computer Assisted Vocational Math classes were limited to ten students. There were two reasons for this class size. First, there would be a one-to-one correspondence of students to computers on computer day (the fifth day). Second, the programs could be designed to meet the needs of the pilot group. If, however, access to a larger number of computers is possible, the class enrollment could be increased. The topics covered in the Computer Assisted Vocational Math curriculum were developed through the joint effort of the vocational teachers, from the shared-time Vocational-Technical school and the mathematics teachers from the sending district. The curriculum has been formulated to increase the basic mathematics skills of students in the following vocational programs: Automotive Trades; Beauty Culture; Building Trades; Climate Control; Electrical Trades; Medical/Dental Technology, and Recreational Vehicles.

A total of 32 packets were produced (see Sample Packet Breakdown). Since some topics required more instructional time than others, coordinated computer games were supplemented when necessary.

The Computer Assisted Vocational Mathematics curriculum is not intended to be used alone but should be used to enhance a vocational mathematics/applied math course. Since the typical school year consists of 40 weeks, a 32-week program allows for individual school differences.

I. PROGRAM TITLE - "Diagnostic Test"

II. PROGRAM DESCRIPTION
Students will complete a diagnostic skills inventory. Areas tested include addition, subtraction, multiplication and division of whole numbers, decimals and fractions. Money problems, both in computation and application situations, and a variety of word problems are also tested.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS (see attached)
1. Salem County Math Placement Test (pre-test)
2. Salem County Math Post-Test
3. Minimum Basic Skills Test, 1979
4. Minimum Basic Skills Test, 1980

```
        10 '************* BASIC DIAGNOSTIC TEST *******************
*
11 '*** WRITTEN J. DALY, M.MCALISTER, M.MCNEARNEY    ****
12 ' ****** FOR COMPUTER ASSISTED VOC. MATH **************
13 ' ****************************************************
14 CLS:PRINT @448,"GOOD MORNING, WHAT IS YOUR NAME";:INPUTB$
15 PRINT
16 DIM G$(24),I$(24):K=1
17 K=1
19 CLS
20 ' *********** DIRECTIONS *********************
21 PRINT @400, "THIS IS A DIAGNOSTIC TEST "
25 FOR X=1 TO 127:SET(X,13):SET(X,26):NEXT X
26 GOSUB4000
30 CLS
35 PRINT @75, "YOU WILL NEED A PENCIL AND PAPER."
36 FOR X=1 TO 127: SET (X,6):NEXT X
40 PRINT @203, "THE TEST WILL COVER THE FOLLOWING:"
50 PRINT @331, "ADDITION AND SUBTRACTION OF WHOLE NUMBERS"
60 PRINT @395, "MULTIPLICATION OF WHOLE NUMBERS"
70 PRINT @459, "DIVISION OF WHOLE NUMBERS"
75 PRINT @523, "OPERATIONS WITH FRACTIONS"
80 PRINT @587, "OPERATIONS WITH DECIMALS "
85 PRINT @651,"PERCENTAGES"
90 PRINT @715, "SELECTING AN OPERATION"
95 PRINT @779, "WORD PROBLEMS"
100 GOSUB4000
101 CLS
109 PRINT@180,"PROB. # 1"
110 PRINT @280, "ADD"
115 A1=RND(8999)+1000:A2=RND(89)+10:A3=RND(899)+100
120 PRINT@407,A1:PRINT@473,A2:PRINT@536,A3
130 PRINT@600,STRING$(5,CHR$(95))
140 GOSUB 3000
150 G=A1+A2+A3:G$(1)=STR$(G)
160 IF VAL(A$)=G THEN GOSUB 5000:ELSE GOSUB 6000:I$(K)="ADDITION O
F WHOLE NUMBERS":K=K+1
170 GOSUB 4000
171 CLS
172 PRINT@180,"PROB. # 2"
175 PRINT@340,"SUBTRACT"
176 B1=RND(8999)+1000:B2=RND(899)+100
180 PRINT @468,B1:PRINT@533,B2
185 PRINT @596,STRING$(5,CHR$(95))
190 GOSUB 3000
200 G$(2)=STR$(B1-B2)
210 IF VAL(A$)=VAL(G$(2)) GOSUB 5000 ELSE GOSUB 6000:I$(K)="SUBTRA
CTION OF WHOLE NUMBERS":K=K+1
220 GOSUB 4000
225 CLS
235 PRINT@180,"PROB # 3"
240 PRINT @340, "MULTIPLY"
250 C1=RND(899)+100:C2=RND(89)+10
255 G$(3)=STR$(C1*C2)
```

```
260 PRINT @468,C1:PRINT@533,C2
263 PRINT@596,STRING$(5,CHR$(95))
265 GOSUB 3000
270 IF VAL(A$)=VAL(G$(3))GOSUB5000 ELSE GOSUB 6000:I$(K)="MULTIPLI
CATION OF WHOLE NUMBERS":K=K+1
275 GOSUB 4000
280 CLS
285 PRINT@180,"PROB # 4"
290 PRINT @340,"DIVIDE"
310 G$(4)="157"
320 PRINT @463,"6594":PRINT @469,"BY":PRINT @472,"42"
330 GOSUB 3000
340 IF VAL(A$)=VAL(G$(4))  GOSUB 5000 ELSE GOSUB 6000:I$(K)="DIVIS
ION OF WHOLE NUMBERS":K=K+1
350 GOSUB 4000
355 CLS
357 PRINT@180,"PROB # 5"
360 PRINT @280,"ADD"
370 PRINT @400, "46  +  2.6  +  .64"
375 G$(5)="49.24"
377 GOSUB 3000
380 IF VAL(A$)=VAL(G$(5)) GOSUB 5000 ELSE GOSUB 6000:I$(K)="ADDITI
ON OF DECIMALS":K=K+1
385 GOSUB 4000
390 CLS
391 PRINT@180, "PROB # 6"
395 PRINT @278, "SUBTRACT"
410 PRINT@469," 97  -  32.8"
415 G$(6)="64.2":GOSUB3000
420 IF VAL(A$)=VAL(G$(6)) GOSUB 5000 ELSE GOSUB 6000:I$(K)="SUBTRA
CTION OF DECIMALS":K=K+1
430 GOSUB 4000
440 CLS
445 PRINT@180,"PROB # 7"
450 PRINT @278,"MULTIPLY"
460 PRINT @468, "97.1":PRINT @533,"4.7"
465 PRINT @596, STRING$(5,CHR$(95))
466 G$(7)="456.37"
470 GOSUB 3000
475 IF VAL(A$)=VAL(G$(7)) GOSUB 5000 ELSE GOSUB 6000:I$(K)="MULTIP
LICATION OF DECIMALS":K=K+1
480 GOSUB 4000
485 CLS
487 PRINT@180,"PROB # 8"
490 PRINT @340,"DIVIDE"
510 G$(8)="25"
520 PRINT @463, "62.5  BY  2.5"
525 GOSUB 3000
530 IF VAL(A$)=VAL(G$(8)) GOSUB 5000 ELSE GOSUB 6000:I$(K)="DIVISI
ONS OF DECIMALS":K=K+1
540 GOSUB 4000
550 CLS
555 PRINT@180, "PROB #9"
```

```
560 PRINT @280, "ADD"
565 PRINT @408, "4 1/3"
566 PRINT@472, "2 1/6"
567 PRINT @536,STRING$(6,CHR$(95))
568 PRINT@640, " (A) 5 1/2    (B)   6 1/2    (C)  6 2/9    (D)  NO
NE OF THESE":PRINT " CHOOSE A, B, C, OR D"
570 GOSUB 3000:G$(9)="6 1/2"
572 IF A$="B" GOSUB 5000:ELSE GOSUB 6000:I$(K)="ADDITION OF FRACTI
ONS":K=K+1
580 GOSUB 4000
590 CLS
600 PRINT@180, "PROB #10"
605 PRINT@280, "SUBTRACT"
610 PRINT@408, "12 3/4"
612 PRINT@472, "-3 1/8"
614 PRINT@536,STRING$(6,CHR$(95))
616 PRINT @640, " (A) 9 5/8   (B) 9 2/4   (C) 8 5/8   (D) NONE OF
THESE"
618 PRINT "CHOOSE A, B, C OR D"
620 GOSUB 3000:G$(10)="9 5/8"
622 IF A$="A" GOSUB 5000:ELSE GOSUB 6000:I$(K)="SUBTRACTION OF FRA
CTIONS":K=K+1
625 GOSUB4000
630 CLS
635 PRINT @180,"PROB #11"
637 PRINT @280, "SUBTRACT"
640 PRINT@408, "14"
642 PRINT@472,"-4 7/8"
644 PRINT@536,STRING$(6,CHR$(95))
646 PRINT @640, "(a)  10 7/8   (B)  9 1/8   (C)  10 1/8   (D) NONE
 OF THESE"
648 PRINT" CHOOSE A, B, C OR D"
650 GOSUB 3000:G$(11)="9 1/8"
652 IF A$="B" GOSUB 5000:ELSE GOSUB6000:I$(K)="SUBTRACTION OF WHOL
E NUMBERS AND FRACTIONS":K=K+1
655 GOSUB4000
660 CLS
665 PRINT@180,"PROB #12"
667 PRINT@280,"MULTIPLY"
670 PRINT @ 471, "2/3  X  5/6"
675 PRINT @640, "(A)  7/9   (B)  10/9   (C)  5/9   (D) NONE OF THE
SE"
677 PRINT"CHOOSE A, B, C OR D"
680 GOSUB3000:G$(12)="5/9"
682 IF A$="C" GOSUB5000:ELSE GOSUB6000:I$(K)="MULTIPLICATION OF FR
ACTIONS":K=K+1
685 GOSUB4000
687 CLS
690 PRINT@180,"PROB #13"
692 PRINT@280,"MULTIPLY"
695 PRINT@471,"4 1/2  X  3"
697 PRINT@640, "(A) 12 1/2   (B) 4 3/2   (C) 4 1/6  (D) NONE OF TH
ESE"
699 PRINT "CHOOSE A, B, C OR D"
700 GOSUB3000:G$(13)=" D  13 1/2"
702 IF A$="D" GOSUB5000:ELSE GOSUB6000:I$(K)="MULTIPLICATION OF FR
ACTIONS AND WHOLE NUMBERS":K=K+1
```

```
704 GOSUB4000
706 CLS
708 PRINT@180,"PROB #14"
710 PRINT@280,"DIVIDE"
712 PRINT@468, "6 DIVIDED BY 1/3"
715 PRINT@640, "(A) 18   (B) 2   (C) 1/2   (D) NONE OF THESE"
717 PRINT"CHOOSE A, B, C OR D"
720 GOSUB 3000: G$(14)="18"
722 IFA$="A" OR A$="18" GOSUB5000:ELSE GOSUB 6000: I$(K)="DIVISION
 OF FRACTIONS":K=K+1
724 GOSUB4000
725 CLS
730 PRINT@180,"PROB #15"
732 PRINT @280,"ADD"
734 PRINT @463,"$3.40 + $1.35 + .55"
735 GOSUB 3000:G$(15)="5.30"
737 IF A$="5.30" OR A$="$5.30" THEN GOSUB5000:ELSE GOSUB6000:I$(K)
="HORIZONTAL ADDITION OF MONEY":K=K+1
740 GOSUB4000
742 CLS
744 PRINT@180,"PROB #16"
746 PRINT @280,"FIND"
748 PRINT @465," 15 %  OF  $9.60"
750 GOSUB3000:G$(16)="$1.44"
755 IF A$="1.44" OR A$="$1.44" THEN GOSUB 5000:ELSE GOSUB 6000:I$(
K)="FINDING PERCENTS":K=K+1
760 GOSUB4000
762 CLS
765 PRINT@180,"PROB #17"
766 PRINT@448, "YOU SPEND $4.88 FOR A PHONOGRAPH RECORD AND $3.95
FOR DEVELOPING A ROLL OF FILM.  TO FIND THE TOTAL AMOUNT OF MONEY
YOU SPENT,  YOU "
768 PRINT:PRINT " ADD     SUBTRACT     MULTIPLY     DIVIDE"
770 GOSUB3000:G$(17)="ADD"
772 IF A$="ADD" THEN GOSUB 5000: ELSE GOSUB 6000: I$(K)="SELECTING
 THE ADDITION OPERATION":K=K+1
775 GOSUB4000
780 CLS
782 PRINT@180,"PROB #18"
784 PRINT @448, "YOU WIN THE POPULARITY CONTEST IN SCHOOL WITH 288
 VOTES AMONG 16 CLASSES.  TO FIND THE AVERAGE NUMBER OF VOTES PER
CLASS, YOU"
786 PRINT:PRINT" ADD     SUBTRACT     MULTIPLY     DIVIDE"
790 GOSUB 3000: G$(18)="DIVIDE"
792 IF A$="DIVIDE" THEN GOSUB5000:ELSE GOSUB 6000: I$(K)="SELECTIN
G THE DIVISION OPERATION":K=K+1
794 GOSUB 4000
796 CLS
800 PRINT@180,"PROB #19"
802 PRINT @448,"A CLASS OF 32 STUDENTS MUST PAY $5.50 EACH TO GO O
N THE CLASS   TRIP.  THE QUICKEST METHOD TO FIND THE TOTAL AMOUNT
OF MONEY    COLLECTED IS TO"
804 PRINT:PRINT "ADD     SUBTRACT     MULTIPLY    DIVIDE"
806 GOSUB3000:G$(19)="MULTIPLY"
```

```
810 IF A$="MULTIPLY" THEN GOSUB 5000: ELSE GOSUB 6000: I$(K)="SELE
CTING THE MULTIPLICATION OPERATION":K=K+1
812 GOSUB4000
814 CLS
816 PRINT @180,"PROB #20"
820 PRINT@448, "THERE ARE 438 SOPHOMORES AND 621 FRESHMEN ATTENDIN
G YOUR SCHOOL.  TO FIND OUT HOW MANY MORE FRESHMEN THERE ARE THAN
SOPHOMORES, YOU "
822 PRINT:PRINT"ADD     SUBTRACT     MULTIPLY     DIVIDE"
824 GOSUB3000:G$(20)="SUBTRACT"
826 IF A$="SUBTRACT" THEN GOSUB 5000: ELSE GOSUB 6000: I$(K)="SELE
CTING THE SUBTRACTION OPERATION":K=K+1
828 GOSUB4000
830 CLS
831 PRINT@180,"PROB #21"
832 PRINT @448,"CHERYL CHARGES $1.50 PER HOUR FOR BABY SITTING.HOW
 MUCH DOES SHE EARN IF SHE WORKS 12 HOURS?"
834 GOSUB 3000:G$(21)="$18.00"
836 IF A$="$18.00" OR A$="18.00" OR VAL(A$)=VAL(G$(21)) OR A$="18"
 OR A$="$18" OR A$="18."THEN GOSUB 5000:ELSE GOSUB 6000:I$(K)="PRO
BLEM SOLVING USING MULTIPLICATION":K=K+1
840 GOSUB4000
842 CLS
844 PRINT@180,"PROB #22"
846 PRINT @448,"JOHN BUYS A MOTHER'S DAY GIFT FOR $12.00.  IF THE
STATE SALES   TAX IS 8 %, HOW MUCH MONEY MUST HE PAY IN TAXES?"
848 GOSUB3000:G$(22)="$.96"
850 IF A$=".96" OR A$="$.96" OR VAL(A$)=VAL(G$(22)) THEN GOSUB 500
0: ELSE GOSUB 6000:I$(K)="PROBLEM SOLVING USING PERCENTS":K=K+1
855 GOSUB4000
860 CLS
862 PRINT @180,"PROB #23"
864 PRINT@448,"SUI LING WENT SHOPPING AND BOUGHT TWO CONTAINERS OF
 MILK FOR    $.48 EACH AND THREE CANS OF ORANGE JUICE FOR $.53 EAC
H.  WHAT   WAS HER TOTAL GOCERY BILL?"
866 GOSUB3000:G$(23)="$2.55"
868 IF A$="2.55" OR A$="$2.55" THEN GOSUB 5000:ELSE GOSUB 6000:I$(
K)="PROBLEM SOLVING USING MULTIPLICATION AND ADDITION":K=K+1
870 GOSUB 4000
872 CLS
874 PRINT@180,"PROB #24"
876 PRINT@448,"ROSA EARNED $27.25, $30.50, $28.75, AND $30.50 FOR
THE PAST      4 WEEKS.  HER AVERAGE PAY IS?"
878 GOSUB 3000:G$(24)="$29.25"
880 IF A$="$29.25" OR A$="29.25" THEN GOSUB 5000:ELSE GOSUB 6000:I
$(K)="PROBLEM SOLVING USING ADDITION AND DIVISION"
890 GOSUB4000
895 CLS
900 GOTO8000
```

```
3000 PRINT @832, "YOUR ANSWER";:INPUT A$
3001 RETURN
4000 PRINT @960,"PRESS C TO CONTINUE."
4001 A$=INKEY$:IFA$="C" RETURN
4002 IF A$="S" GOTO 8000
4003 GOTO 4001
5000 PRINT @896, "CORRECT":C=C+1:N=N+1:RETURN
6000 N=N+1:PRINT @896, "SORRY THE ANSWER IS ";G$(N):RETURN
7000 DATA 4  1/3 + 2  1/6,6,1,2
8000 CLS:PRINT @512," ";:INPUT "DO YOU WANT A HARD COPY";K$
8001 IF K$="NO" OR K$="N" GOTO 9500
9000 LPRINT B$"'S SCORE IS "INT(((C/N)+.005)*100)"%":PRINT"YOU HAD
"C" OUT OF"N" CORRECT":LPRINT "YOU MISSED THE FOLLOWING PROBLEMS:"
9001 FOR Q=1 TO K
9002 LPRINT I$(Q)
9003 NEXT:IF N=24 END
9004 INPUT "ENTER C IF YOU WISH TO CONTINUE";K1$
9005 IF K1$="C" RETURN
9500 PRINT B$"' S SCORE IS "INT(((C/N)+.005)*100)"%":PRINT"YOU HAD
"C" OUT OF"N" CORRECT":PRINT "YOU MISSED THE FOLLOWING PROBLEMS:"
9510 FOR Q=1TOK:PRINT I$(Q):NEXT
9515 IF N=24 THEN END
9520 INPUT "ENTER C IF YOU WISH TO CONTINUE";K1$
9522 IF K1$="C"RETURN
```

DIAGNOSTIC SKILLS INVENTORY

Test 1

WHOLE NUMBERS

1. $\begin{array}{r} 4,233 \\ +\ 907 \\ \hline \end{array}$

2. 589 + 1016 = ________

3. $\begin{array}{r} 2,401 \\ -\ 1,266 \\ \hline \end{array}$

4. 4,753 - 961 = ________

5. 3,126 x 13 = ______

6. 549 x 42 = ________

7. $7\overline{)\,5,124}$

8. 3120 ÷ 15 = ________

For problems 9 and 10, circle the answer you think will be closest to the right answer.

9. 59 x 701 =

a) 4,000 b) 42,000 c) 35,000

10. 13,021 + 6,979 =

a) 20,000 b) 10,000 c) 19,000

Test 1, Continued

FRACTIONS AND DECIMALS

Fill in the spaces in the chart below. The chart shows Equivalent Fractions and Decimals

FRACTION	DECIMAL
$\frac{1}{10}$	.1 or .10
$\frac{1}{5}$ $\frac{2}{10}$	.2 or .20
$\frac{1}{4}$	11)
12)	.3 or .30
$\frac{1}{3}$	.33
$\frac{2}{5}$ $\frac{4}{10}$	.4 or .40
$\frac{1}{2}$ $\frac{2}{4}$ $\frac{5}{10}$	.5 or .50
13)	.6 or .60
$\frac{2}{3}$	14)
$\frac{7}{10}$	15)
16)	.75
$\frac{8}{10}$	.8 or .80
$\frac{9}{10}$	.9 or .90

ROUNDING OFF DECIMALS

Round off each decimal to 3 decimal places.

17. 6.2357 = ____________

18. 12.00148 = ____________

WORKING WITH FRACTIONS

Reduce to Lowest Terms

19. $\frac{18}{16}$ = __________

20. $\frac{12}{14}$ = __________

21. Convert $\frac{3}{8}$ to a 3-place decimal ____________

22. Convert .35 to a fraction in its lowest terms ____________

23. $2\frac{1}{5} + 3\frac{3}{5}$

24. $\frac{3}{4} + \frac{1}{3} =$ ______

25. $4\frac{1}{4} - 2\frac{3}{4}$

26. $\frac{7}{8} - \frac{1}{2} =$ ______

27. $\frac{2}{3} \times \frac{4}{5} =$ ____

28. $1\frac{1}{2} \times 5 =$ ________

29. $2\frac{2}{5} \times \frac{1}{2} =$ __________

30. $11 \div 4 =$ ________

31. $\frac{3}{5} \div \frac{3}{8} =$ ________

32. $2\frac{1}{4} \div 3 =$ ________

WORKING WITH DECIMALS AND PERCENTS

33. 14.325 + 2.5 = ________

34. 0.0125 + 1.625 = ________

35. 3.4162 - 1.0305 = ________

36. 4 - 1.317 = ________

37. $\begin{array}{r} 42.25 \\ \underline{\times\ \ 11} \end{array}$

38. $\begin{array}{r} 7.315 \\ \underline{\times\ 2.3} \end{array}$

39. $25\overline{)17.325}$

40. $3.2\overline{)17.048}$

41. \$4.17 + \$21.00 + \$9.50 + \$1.08 = ________

42. \$5 - \$2.39 = ________

43. An item selling for \$17.95 is on sale at 20% off. What is the sale price?

____

44. If you earn \$220 a week and get a 5% raise, what will you then earn per week?

____

Test 1, Continued

MEASUREMENT

Measure each line below to the nearest ¼"

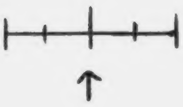
45. ____ = ____________

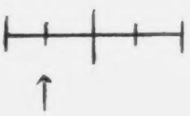
46. ______________________ = ____________

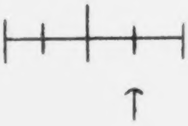
47. ____ = ____________

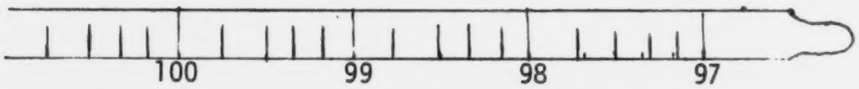
Indicate what each mark on the ruler represents.

48. ____________ 49. ____________ 50. ____________





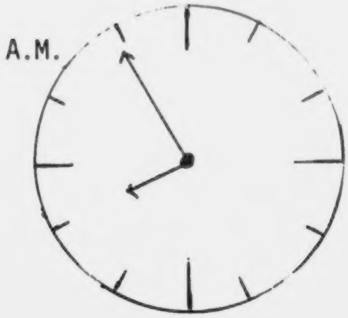




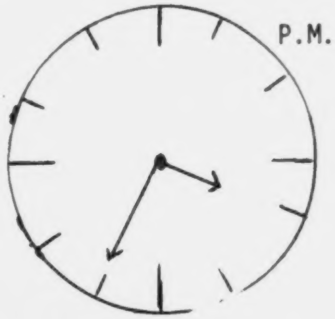
51. What temperature does this thermometer read?

52. If the clocks below represent your clock-in and clock-out times, how long were you on the job?

Hours__________ Minutes_________



IN



OUT

WEIGHTS AND MEASURES

Give these answers in their simplest form.

(Example: 3 minutes 70 seconds = 4 minutes 10 seconds)

53. 3 hours 20 minutes

+ 2 hours 45 minutes

_____ hours _____ minutes

54. 9 feet 6 inches

- 4 feet 5 inches

_____feet _____inches

55. 3 pounds 11 ounces

+ 7 pounds 5 ounces

_____ pounds _____ ounces

DIAGNOSTIC SKILLS INVENTORY

Test 2

WHOLE NUMBERS

1. $\begin{array}{r} 2,789 \\ +\ 1,062 \\ \hline \end{array}$

2. 3,407 + 861 = ________

3. $\begin{array}{r} 4,093 \\ -\ 1,444 \\ \hline \end{array}$

4. 1,426 - 976 = ________

5. $\begin{array}{r} 866 \\ \times\ \ 73 \\ \hline \end{array}$

6. 1,134 x 55 = ________

7. $18\overline{)\,3,870}$

8. 2,696 ÷ 8 = ________

For problems 9 and 10, circle the answer you think will be closest to the right answer.

9. 99 x 399 =

a) 27,000   b) 36,000   c) 40,000

10. 11,997 - 4,003 =

a) 9,000   b) 8,000   c) 7,000

Test 2, Continued

FRACTIONS AND DECIMALS

Fill in the spaces in the chart below. The chart shows Equivalent Fractions and Decimals. Make sure Fraction answers are given in lowest terms.

FRACTION	DECIMAL
$\frac{1}{10}$	11)
$\frac{1}{5}$ $\frac{2}{10}$	.2 or .20
12)	.25
$\frac{3}{10}$	.3 or .30
13)	.33
$\frac{2}{5}$ $\frac{4}{10}$	.4 or .40
14)	.5 or .50
$\frac{3}{5}$ $\frac{6}{10}$	.6 or .60
$\frac{2}{3}$	15)
$\frac{7}{10}$	.7 or .70
$\frac{3}{4}$	16)
$\frac{4}{5}$ $\frac{8}{10}$	.8 or .80
$\frac{9}{10}$	.9 or .90

Test 2, Continued

ROUNDING OFF DECIMALS

17. Round off to the nearest hundredth:

$46.769 = $ ________________

18. Round off to the nearest thousandth:

$2.069347 = $ ________________

WORKING WITH FRACTIONS

Reduce to Lowest Terms:

19. $\frac{12}{24}$

20. $\frac{5}{40}$

21. Convert $\frac{5}{4}$ to a two-place decimal ____________

22. Convert .16 to a fraction in its lowest terms ______________

Give each answer below in its lowest terms:

23.
$$\begin{array}{r} 4\frac{3}{4} \\ +\ 5\frac{1}{4} \\ \hline \end{array}$$

24. $\frac{1}{2} + \frac{2}{5} = $ ________

25.
$$\begin{array}{r} 9\frac{3}{5} \\ -\ 7\frac{4}{5} \\ \hline \end{array}$$

26. $\frac{9}{10} - \frac{3}{4} = $ ___________

27. $\frac{1}{4} \times \frac{2}{5} = $ ________

28. $2\frac{1}{3} \times 3 = $ _________

Test 2, Continued

29. $4\frac{1}{2} \times \frac{1}{3} =$ ______

30. $15 \div 6 =$ ______

31. $\frac{9}{10} \div \frac{3}{5} =$ ______

32. $\frac{3}{8} \div 3 =$ ______

33. $71.58 + $109 = ______

34. 4.1032 + 787.897 = ______

35. 46.82 - 17.63 = ______

36. $26 - $9.18 = ______

37. $$\begin{array}{r} \$34.09 \\ \underline{\times\ \ 22} \end{array}$$

38. $$\begin{array}{r} 4.226 \\ \underline{\times\ 3.3} \end{array}$$

39. $6\overline{)26.52}$

40. $2.4\overline{)98.16}$

41. $21 + $9.38 + 42¢ + $5.70 = ______

42. $117 - 84¢ = ______

43. An item usually selling for $30.30 is on sale at 15% off. What is the sale price?

______

44. If you earn $237 a week and get a 10% raise, what will your new salary be?

______

Test 2, Continued

MEASUREMENT

Measure each line to the nearest $\frac{1}{4}$ inch.

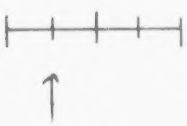
45. ________________________ = __________

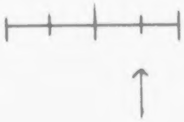
46. ____ = __________

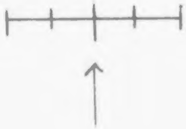
47. _____________ = __________

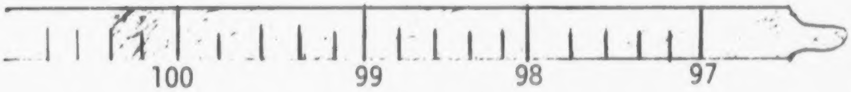
Indicate what each mark on the ruler represents:

48. ________________ 49. ______________ 50. ____________





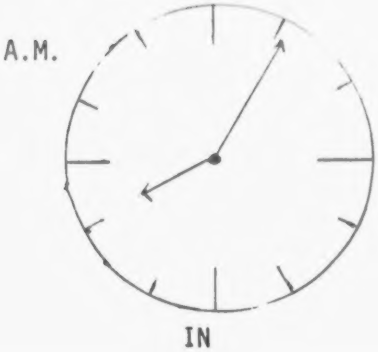


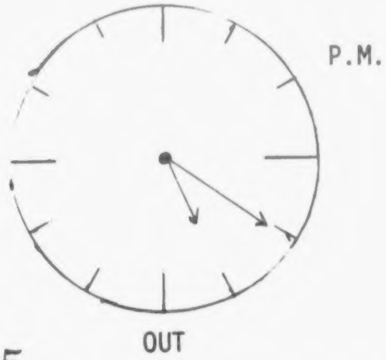


51. What temperature does this thermometer read? ______________

52. If the clocks below represent clock-in and clock-out times, how long were you on the job?

Hours _______ Minutes _______





Test 2, Continued

WEIGHTS AND MEASURES

Give these answers in their simplest form.

(Example: 3 minutes 70 seconds = 4 minutes 10 seconds)

53. 4 feet 2 inches
+ 12 feet 9 inches

________ feet ________ inches

54. 5 hours 53 minutes
- 4 hours 47 minutes

________ hours ________ minutes

55. 4 pounds 10 ounces
+ 2 pounds 10 ounces

________ pounds ________ ounces

DIAGNOSTIC SKILLS INVENTORY

Test 3

COMPUTATION

1.
$$\begin{array}{r} 145 \\ +\ 724 \\ \hline \end{array}$$

(A) 868
(B) 869
(C) 889
(D) 979

2. 176 - 64 =

(A) 564
(B) 464
(C) 112
(D) 12

3. 253 + 25 =

(A) 278
(B) 288
(C) 403
(D) 503

4.
$$\begin{array}{r} 597 \\ -\ 454 \\ \hline \end{array}$$

(A) 43
(B) 133
(C) 142
(D) 143

5.
$$\begin{array}{r} 4{,}526 \\ +\ 575 \\ \hline \end{array}$$

(A) 5,101
(B) 5,091
(C) 5,001
(D) 4,091

6.
$$\begin{array}{r} 641 \\ -\ 265 \\ \hline \end{array}$$

(A) 376
(B) 386
(C) 424
(D) 476

7. 46 + 87 =

(A) 122
(B) 123
(C) 132
(D) 133

8. 132 - 57 =

(A) 25
(B) 75
(C) 85
(D) 125

Test 3, Continued

9. $$\begin{array}{r} 4{,}005 \\ -\ 534 \\ \hline \end{array}$$

(A) 3,461
(B) 3,471
(C) 3,561
(D) 3,571

10. $7\overline{)\,889}$

(A) 111
(B) 114
(C) 127
(D) 147

11. $$\begin{array}{r} 394 \\ \times\ 87 \\ \hline \end{array}$$

(A) 5,800
(B) 5,990
(C) 33,278
(D) 34,278

12. $37\overline{)\,74{,}037}$

(A) 21
(B) 201
(C) 2,001
(D) 20,001

13. 405 x 26 =

(A) 3,240
(B) 8,530
(C) 10,530
(D) 10,790

14. $15\overline{)\,223}$

In the division problem above, what is the remainder?

(A) 3
(B) 13
(C) 14
(D) 23

15. 53 x 700 =

(A) 5,600
(B) 36,100
(C) 37,100
(D) 37,200

16. In which of the division problems below is the remainder 3?

(A) $8\overline{)\,78}$

(B) $7\overline{)\,68}$

(C) $6\overline{)\,58}$

(D) $5\overline{)\,48}$

Test 3, Continued

17. $$\begin{array}{r} \frac{7}{9} \\ -\ \frac{2}{9} \\ \hline \end{array}$$

(A) $\frac{5}{18}$

(B) $\frac{5}{9}$

(C) 1

(D) 5

18. $$\begin{array}{r} 7\frac{1}{5} \\ -\ 4\frac{3}{4} \\ \hline \end{array}$$

(A) $2\frac{1}{20}$

(B) $2\frac{9}{20}$

(C) $3\frac{9}{20}$

(D) $3\frac{11}{20}$

19. $$\begin{array}{r} \frac{2}{3} \\ +\ \frac{1}{5} \\ \hline \end{array}$$

(A) $\frac{2}{15}$

(B) $\frac{1}{5}$

(C) $\frac{3}{8}$

(D) $\frac{13}{15}$

20. $$\begin{array}{r} 5\frac{4}{7} \\ +\ 1\frac{1}{7} \\ \hline \end{array}$$

(A) $6\frac{5}{7}$

(B) $6\frac{3}{7}$

(C) $6\frac{5}{14}$

(D) $7\frac{3}{14}$

21. $$\begin{array}{r} 50\frac{3}{8} \\ +\ 5\frac{1}{2} \\ \hline \end{array}$$

(A) $56\frac{1}{8}$

(B) $55\frac{7}{8}$

(C) $55\frac{7}{16}$

(D) $55\frac{4}{10}$

22. $$\begin{array}{r} 25\frac{1}{3} \\ -\ 20\frac{2}{3} \\ \hline \end{array}$$

(A) $4\frac{1}{3}$

(B) $4\frac{2}{3}$

(C) $5\frac{1}{3}$

(D) $5\frac{2}{3}$

Test 3, Continued

23. $\frac{2}{3} \times 18 =$

(A) $\frac{1}{27}$

(B) $\frac{36}{54}$

(C) 12

(D) 27

24. $\frac{5}{7} \times \frac{3}{8} =$

(A) $\frac{15}{56}$

(B) $\frac{21}{40}$

(C) $\frac{40}{21}$

(D) $\frac{56}{15}$

25. $9 \div \frac{2}{5} =$

(A) $\frac{2}{45}$

(B) $\frac{5}{18}$

(C) $\frac{18}{5}$

(D) $\frac{45}{2}$

26. $\frac{3}{16} \div \frac{5}{12} =$

(A) $\frac{15}{192}$

(B) $\frac{9}{20}$

(C) $\frac{20}{9}$

(D) $\frac{192}{15}$

27. $2\frac{3}{4} \times 12 =$

(A) $14\frac{3}{4}$

(B) 13

(C) $24\frac{3}{4}$

(D) 33

28. $2.31 + 10.4 + 0.36 =$

(A) 0.00371

(B) 3.71

(C) 12.71

(D) 13.07

29.
$$\begin{array}{r} 16.1 \\ +\ 2.58 \\ \hline \end{array}$$

(A) 1.859
(B) 5.868
(C) 18.59
(D) 18.68

30.
$$\begin{array}{r} 19.56 \\ -\ 1.923 \\ \hline \end{array}$$

(A) 17.637
(B) 17.643
(C) 18.443
(D) 18.637

31. 67.98 - 5.3 =

(A) 6.268
(B) 14.98
(C) 62.68
(D) 67.45

32. 1.05 x 0.4 =

(A) 0.006
(B) 0.42
(C) 0.6
(D) 4.2

33.

```
 0  .  7  4  5
x      2  .  1
--------------
       7  4  5
 1  4  9  0
--------------
 1  5  6  4  5
  ↑  ↑  ↑  ↑
  A  B  C  D
```

Which arrow points to the correct place for the decimal point in the answer above?

(A) A
(B) B
(C) C
(D) D

34. $17\overline{)8.84}$

(A) 0.052
(B) 0.52
(C) 5.2
(D) 52

35. 9.8 x 100 =

(A) 9.800
(B) 98
(C) 900.8
(D) 980

36. $3.5\overline{)70}$

(A) 0.02
(B) 0.2
(C) 2
(D) 20

37. $2.1\overline{)1.176}$

(A) 0.0056
(B) 0.056
(C) 0.56
(D) 5.6

38. 2.5 ÷ 1,000=

(A) 0.0025
(B) 0.025
(C) 250
(D) 2,500

39. 3% of 60 is

(A) 0.18
(B) 0.2
(C) 1.8
(D) 20

40. $\frac{45}{30}$ =

(A) $\frac{2}{3}$
(B) $\frac{4}{3}$
(C) $\frac{3}{2}$
(D) $\frac{9}{5}$

41. $\frac{5}{8} =$

(A) $\frac{2}{5}$

(B) $\frac{8}{11}$

(C) $\frac{15}{24}$

(D) $\frac{53}{83}$

42. What is 25 per cent of 200?

(A) 50
(B) 250
(C) 800
(D) 5,000

43. 2 is 5% of what number?

(A) 40
(B) 20
(C) 4
(D) 0.1

44. Which of the following is greater than ½?

(A) $\frac{2}{3}$

(B) $\frac{2}{5}$

(C) $\frac{2}{6}$

(D) $\frac{2}{7}$

45. $2\frac{4}{5} =$

(A) $\frac{11}{5}$

(B) $\frac{13}{5}$

(C) $\frac{14}{5}$

(D) $\frac{28}{5}$

46. Change 24% to a decimal.

(A) 0.024
(B) 0.24
(C) 2.4
(D) 24

47. $\frac{6}{25} =$

(A) 0.06
(B) 0.24
(C) 0.30
(D) 4.16

48. Change 0.82 to a per cent.

(A) 0.0082%
(B) 82%
(C) 820%
(D) 8,200%

49. Round 0.46376 to three decimal places.

(A) 0.468
(B) 0.463
(C) 0.464
(D) 0.500

50. 6.09 =

(A) $\frac{609}{1,000}$

(B) $6\frac{9}{1,000}$

(C) $6\frac{9}{100}$

(D) $6\frac{9}{10}$

51. Round 456.26 to the nearest tenth.

(A) 450
(B) 456.2
(C) 456.3
(D) 460

52. Round 12,638 to the nearest hundred.

(A) 12,600
(B) 12,640
(C) 12,700
(D) 13,000

53. If 5 + n = 5, then n =

(A) -5
(B) 0
(C) $\frac{1}{5}$

(D) 1

54. Which of the following is an odd number?

(A) 12
(B) 14
(C) 21
(D) 24

55. Which of the following statements is true?

(A) 6 x 1 = 7
(B) 6 x 0 = 6
(C) 6 x 1 = 1
(D) 6 x 1 = 6

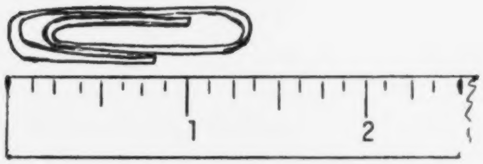
56. $6^2 =$

(A) 3
(B) 8
(C) 12
(D) 36

57. If 8 x $\square$ = 0, then $\square$ =

(A) -8
(B) 0
(C) $\frac{1}{8}$
(D) 1

58.



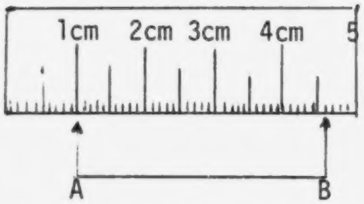
The length in inches of the paper clip shown above is about

(A) $1\frac{1}{8}$
(B) $1\frac{2}{8}$
(C) $1\frac{3}{8}$
(D) $1\frac{4}{8}$

59. Square feet is an appropriate measure for

(A) volume
(B) perimeter
(C) length
(D) area

60.



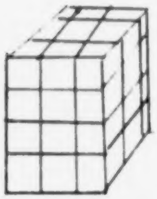
What is the distance between A and B above?

(A) 3.5 cm
(B) 3.6 cm
(C) 4.5 cm
(D) 4.6 cm

61. 3 pounds 2 ounces =

(A) 32 ounces
(B) 38 ounces
(C) 47 ounces
(D) 50 ounces

62.



The box shown above is made up of 1-centimeter cubes. The volume of the box is how many cubic centimeters?

(A) 24
(B) 27
(C) 36
(D) 64

63. At 6:00 p.m., the thermometer reading was 12°. By 11:00 p.m. the temperature had dropped 22 degrees. What was the reading at 11:00 p.m.?

(A) -34°
(B) -10°
(C) 10°
(D) 34°

65. 1 kilometer =

(A) 10 meters
(B) 100 meters
(C) 1,000 meters
(D) 10,000 meters

67. The formula for the area of a circle is $A = \pi \times r^2$ where r is the radius of the circle. If 3.14 is used as the value of π, what is the area of a circle with a radius of 5?

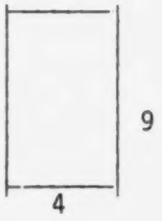
(A) 15.7
(B) 19.6
(C) 31.4
(D) 78.5

64. Which of the following could be the weight of a pencil?

(A) 10 grams
(B) 10 liters
(C) 10 meters
(D) 10 degrees

66. The formula for the area of a rectangle is A = l x w. What is the area of the rectangle below?

(A) 13
(B) 26
(C) 36
(D) 72



68. A car left Atlantic City at 9:00 a.m. on Tuesday morning and arrived in Orlando, Florida at 1:00 p.m. Thursday afternoon of the same week. How many hours did the trip take?

(A) 52
(B) 53
(C) 75
(D) 76

Test 3, Continued

69. The formula for the area of a square is $A = s^2$ where s is the side of the square. If the side of a square is 7, what is its area?

(A) 9
(B) 14
(C) 28
(D) 49

70. After her purchase, a customer is to receive $1.83 in change. Which of the following is the correct amount that the customer should receive?

(A) 1 dollar, 3 quarters, 1 nickel, 3 pennies
(B) 1 dollar, 3 quarters, 1 dime, 3 pennies
(C) 1 dollar, 2 quarters, 2 dimes, 3 pennies
(D) 1 dollar, 1 half-dollar, 1 quarter, 1 dime, 3 pennies

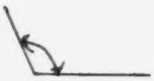
71. The formula for the area of a triangle is $A = \frac{1}{2} x b x h$ where b is the base and h is the height. What is the area of a triangle that has a base of 10 and a height of 6?

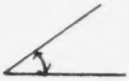
(A) 8
(B) 15
(C) 30
(D) 60

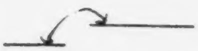
72. If Paul bought 2½ dozen cookies, how many cookies did he buy?

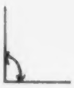
(A) 18
(B) 25
(C) 30
(D) 40

73. Which angle below could represent a right angle?

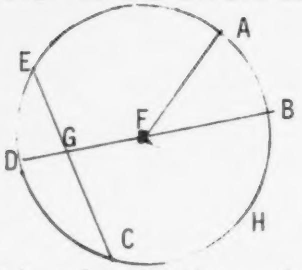
(A)


(B)


(C)


(D)


74-75. Refer to the circle below.



74. Which point is the center of the circle?

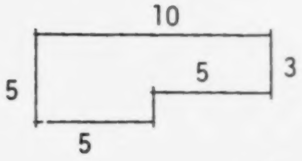
(A) D
(B) F
(C) G
(D) H

75. Which line segment is a diameter?

(A) AF
(B) CE
(C) DB
(D) GE

76. What is the perimeter of the figure below?

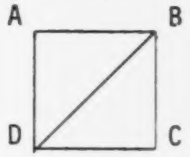
(A) 25
(B) 30
(C) 40
(D) 50



Test 3, Continued

77. In the figure below, which of the following line segments are parallel?

(A) AD and BC
(B) DC and BC
(C) AB and DB
(D) BD and DC



78. If the length of a diameter of a circle is 4 inches, what is the length in inches of a radius?

(A) 1
(B) 2
(C) 3
(D) 16

QUESTIONS 79-81 refer to the following chart:

FOURTH CLASS

(PARCEL POST) ZONE RATES

Weight in Pounds	Local	1 and 2	3	4	5	6	7	8
2____	$0.77	$0.90	$0.93	$1.04	$1.15	$1.28	$1.40	$1.48
3____	.82	.97	1.02	1.15	1.29	1.46	1.62	1.74
4____	.86	1.04	1.10	1.25	1.42	1.63	1.84	2.00
5____	.91	1.11	1.19	1.36	1.56	1.81	2.06	2.26
6____	.95	1.18	1.27	1.46	1.69	1.98	2.28	2.52
7____	1.00	1.25	1.36	1.57	1.83	2.16	2.50	2.78
8____	1.04	1.32	1.44	1.67	1.96	2.33	2.72	3.04
9____	1.09	1.39	1.53	1.78	2.10	2.51	2.94	3.30
10____	1.13	1.46	1.61	1.88	2.23	2.68	3.16	3.58

79. How much would it cost to send a package weighing 4 pounds to Zone 3?

(A) $1.02
(B) $1.10
(C) $1.15
(D) $1.25

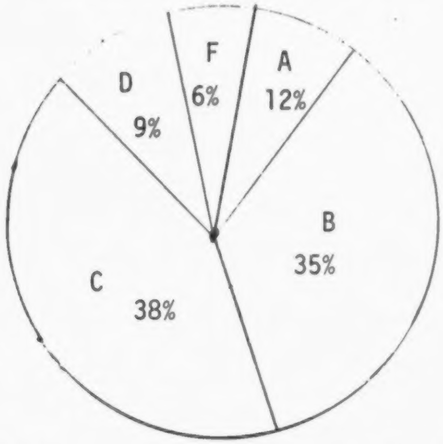
80. How much more would it cost to send an eight-pound package to Zone 8 rather than within the local zone?

(A) $1.04
(B) $2.00
(C) $3.04
(D) $4.08

81. For $1.05, what is the heaviest package you can send locally?

(A) 6 lb.
(B) 7 lb.
(C) 8 lb.
(D) 9 lb.

QUESTIONS 82-84: refer to the following graph.



A = excellent
B = good
C = average
D = poor
F = failure

82. Which grade occurred most often?

(A) A
(B) B
(C) C
(D) D

83. If there were 1,000 students taking English, how many of them received a grade of D?

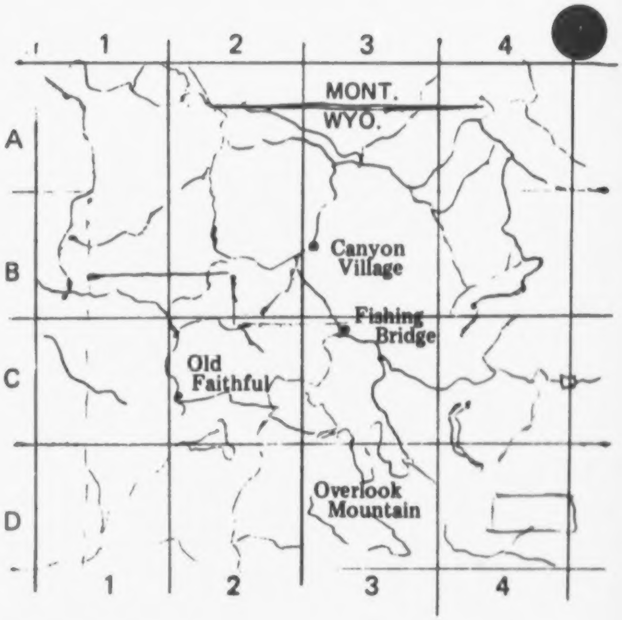
(A) 9
(B) 90
(C) 900
(D) 910

84. Which of the following statements is true about students who took English?

(A) Less then 50% received grades above average.
(B) More than 95% received grades above D.
(C) 25% received grades below average.
(D) 15% failed.

85. On the map of Yellowstone Park at the right, what site is located in region C-2?

(A) Old Faithful
(B) Fishing Bridge
(C) Canyon Village
(D) Overlook Mountain



86. If the annual rate of interest is 9 per cent, what is the interest on a $5,000 loan for one year?

(A) $0.45
(B) $4.50
(C) $45.00
(D) $450.00

87. If the sales tax rate is 5 cents per $1.00, how much is the sales tax on an $80.00 bicycle?

(A) $0.40
(B) $4.00
(C) $40.00
(D) $44.00

88. This year's attendance at Central High School's homecoming football game was 4,000. Last year's attendance at the homecoming was 3,846. What was the increase in attendance this year?

(A) 154
(B) 1,154
(C) 1,846
(D) 7,846

89. What is the price of a $12.00 blouse after a 30% discount?

(A) $3.60
(B) $8.40
(C) $9.60
(D) $15.60

90. What is the average of the test scores: 55, 75, 82 and 88?

(A) 73
(B) 75
(C) 78
(D) 80

91. If 10 oranges cost 89 cents, then to the nearest cent, what is the cost of 2 oranges?

(A) 16
(B) 17
(C) 18
(D) 19

Test 3, Continued

92. Refer to the menu below:

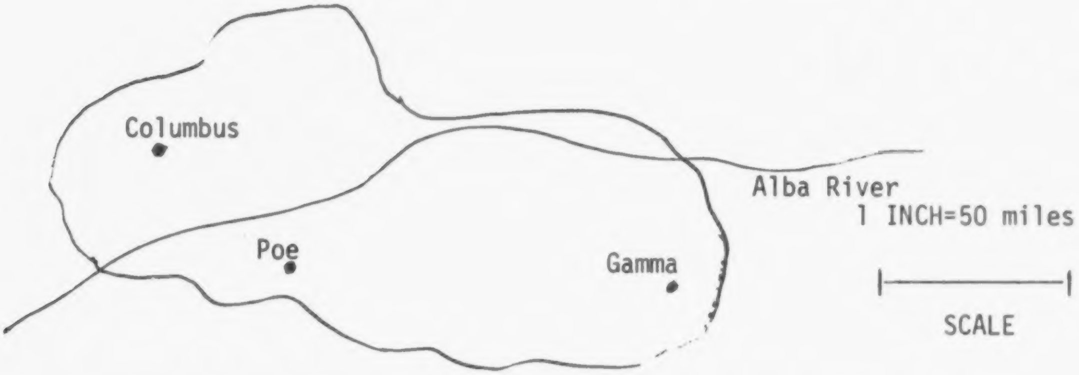
CHAR'S GRILL

Hamburger	$0.75
Hot Dog	0.45
Milk Shake	0.50
Coke	0.25
Pie	0.35
French Fires	0.30

All prices include sales tax.

92. If you bought 3 hamburgers, 1 order of french fries, and 2 Cokes from Char's Grill, what was the bill?

(A) $1.30
(B) $2.55
(C) $2.75
(D) $3.05


Columbus
Poe
Gamma
Alba River
1 INCH=50 miles
SCALE

93. Using the scale above, estimate the direct distance in miles from Columbus to Gamma.

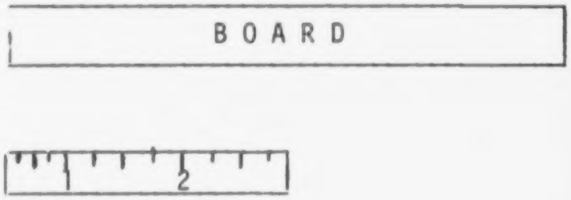
(A) 50
(B) 150
(C) 200
(D) 250

94. A certain car can travel 19 miles on each gallon of gas. Which of the following gives the best approximation of how far the car can travel on 16 gallons of gas?

    (A) 10 x 20
    (B) 15 x 25
    (C) 15 x 20
    (D) 20 x 20

95. If the board below is measured by the ruler shown, what is the approximate length of the board?

    (A) 3 units
    (B) 4 units
    (C) 6 units
    (D) 8 units



DIAGNOSTIC SKILLS INVENTORY

Test 4

1. 451
+ 305

(A) 486
(B) 706
(C) 754
(D) 756

2. 1,542 + 45 =

(A) 1,587
(B) 1,597
(C) 1,992
(D) 6,042

3. 7,468
+ 535

(A) 8,093
(B) 8,003
(C) 7,993
(D) 7,903

4. 828 + 39 =

(A) 857
(B) 867
(C) 868
(D) 1,118

5. 847 - 35 =

(A) 497
(B) 794
(C) 812
(D) 882

6. 748
- 324

(A) 413
(B) 423
(C) 424
(D) 464

7. 536
- 387

(A) 149
(B) 159
(C) 251
(D) 259

8. 125 - 38 =

(A) 87
(B) 97
(C) 113
(D) 255

9. 3,008
- 722

(A) 2,286
(B) 2,386
(C) 3,286
(D) 3,726

10. 948
x 76

(A) 72,048
(B) 71,948
(C) 12,324
(D) 12,224

11. $708 \times 35 =$

(A) 2,730
(B) 5,664
(C) 24,780
(D) 215,940

12. $84 \times 400 =$

(A) 3,360
(B) 4,800
(C) 33,600
(D) 48,000

13. $8\overline{)992}$

(A) 110
(B) 111
(C) 121
(D) 124

14. $12\overline{)36{,}024}$

(A) 32
(B) 302
(C) 3,002
(D) 30,002

15. What is the remainder in the following division problem?

$25\overline{)362}$

(A) 2
(B) 12
(C) 14
(D) 17

16. Which of the division problems below will have no remainder?

(A) $9\overline{)42}$

(B) $8\overline{)42}$

(C) $6\overline{)42}$

(D) $5\overline{)42}$

17.
$$\begin{array}{r} \frac{5}{7} \\ + \frac{2}{7} \\ \hline \end{array}$$

(A) $\frac{3}{14}$

(B) $\frac{3}{7}$

(C) 1

(D) 3

18.
$$\begin{array}{r} \frac{3}{4} \\ + \frac{1}{3} \\ \hline \end{array}$$

(A) $\frac{2}{12}$

(B) $\frac{4}{7}$

(C) $\frac{2}{3}$

(D) $1\frac{1}{12}$

Test 4, Continued

19. $$\begin{array}{r} 21\frac{1}{8} \\ +\ 6\frac{3}{4} \\ \hline \end{array}$$

(A) $28\frac{7}{8}$

(B) $27\frac{7}{8}$

(C) $27\frac{1}{2}$

(D) $27\frac{4}{12}$

20. $$\begin{array}{r} 6\frac{1}{2} \\ -\ 2\frac{3}{4} \\ \hline \end{array}$$

(A) $3\frac{1}{4}$

(B) $3\frac{3}{4}$

(C) $4\frac{1}{4}$

(D) $4\frac{3}{4}$

21. $$\begin{array}{r} 7\frac{2}{5} \\ +\ 2\frac{1}{5} \\ \hline \end{array}$$

(A) $9\frac{3}{5}$

(B) $9\frac{3}{10}$

(C) $9\frac{1}{5}$

(D) $9\frac{2}{25}$

22. $$\begin{array}{r} 19\frac{1}{7} \\ -\ 14\frac{5}{7} \\ \hline \end{array}$$

(A) $4\frac{3}{7}$

(B) $4\frac{4}{7}$

(C) $4\frac{6}{7}$

(D) $5\frac{4}{7}$

23. $\frac{5}{6} \times 30 =$

(A) $\frac{1}{36}$

(B) $\frac{150}{180}$

(C) 25

(D) 36

24. $7 \div \frac{3}{8} =$

(A) $\frac{56}{3}$

(B) $\frac{21}{8}$

(C) $\frac{8}{21}$

(D) $\frac{3}{56}$

Test 4, Continued

25. $2\frac{2}{3} \times 27 =$

(A) $29\frac{2}{3}$

(B) $54\frac{2}{3}$

(C) 63

(D) 72

26. $\frac{5}{9} \times \frac{7}{8} =$

(A) $\frac{12}{72}$

(B) $\frac{35}{72}$

(C) $\frac{40}{63}$

(D) $\frac{12}{17}$

27. $\frac{7}{10} \div \frac{1}{5} =$

(A) 7

(B) $\frac{7}{2}$

(C) $\frac{7}{50}$

(D) $\frac{2}{7}$

28. 17.8 + 4.52 + 0.8 =

(A) 6.38

(B) 22.4

(C) 23.12

(D) 63.8

29. $\begin{array}{r} 142.5 \\ +\ \ 3.78 \\ \hline \end{array}$

(A) 142.878
(B) 146.28
(C) 180.30
(D) 520.5

30. $\begin{array}{r} 23.4 \\ -\ 1.57 \\ \hline \end{array}$

(A) 21.83
(B) 21.97
(C) 22.17
(D) 22.93

31. 15.38 - 12.2 =

(A) 3.06
(B) 3.16
(C) 3.18
(D) 14.16

32. $\begin{array}{r} 1.836 \\ \times\ 0.24 \\ \hline \end{array}$

(A) 0.044064
(B) 0.44064
(C) 4.4064
(D) 44.064

33. 87.2 x 1,000 =

(A) 87.20000
(B) 872
(C) 8,720
(D) 87,200

34. 3.05 x 0.5 =

(A) 0.0175
(B) 0.1525
(C) 1.5025
(D) 1.525

35. $29\overline{)20.88}$

(A) 0.072
(B) 0.72
(C) 7.2
(D) 72

36. $2.3\overline{)69}$

(A) 30
(B) 3
(C) 0.3
(D) 0.03

37. $3.5\overline{)0.7525}$

(A) 0.0215
(B) 0.215
(C) 2.15
(D) 21.5

38. 7.5 ÷ 100 =

(A) 750
(B) 0.75
(C) 0.075
(D) 0.0075

39. What is 5% of 80?

(A) 0.04
(B) 1.6
(C) 4.0
(D) 16.0

40. 15% of $70 =

(A) $4.67
(B) $10.50
(C) $46.70
(D) $105.00

41. $\frac{18}{15}$ =

(A) $\frac{5}{3}$

(B) $\frac{8}{5}$

(C) $\frac{6}{5}$

(D) $\frac{5}{6}$

42. $\frac{7}{3}$ =

(A) $\frac{7}{6}$

(B) $\frac{10}{6}$

(C) $\frac{14}{3}$

(D) $\frac{14}{6}$

Test 4, Continued

43. Which of the following is largest?

(A) $\frac{1}{5}$

(B) $\frac{1}{6}$

(C) $\frac{1}{4}$

(D) $\frac{1}{7}$

44. $\frac{11}{4}$ =

(A) $2\frac{1}{2}$

(B) $2\frac{3}{4}$

(C) $3\frac{1}{4}$

(D) $4\frac{3}{4}$

45. $\frac{9}{20}$ =

(A) 0.09
(B) 0.45
(C) 0.92
(D) 2.22

46. 7.03 =

(A) $\frac{703}{1,000}$

(B) $7\frac{3}{1,000}$

(C) $7\frac{3}{100}$

(D) $7\frac{3}{10}$

47. Change 95% to a decimal.

(A) 0.095
(B) 0.95
(C) 9.5
(D) 95

48. Change 0.59 to a per cent.

(A) 0.0059%
(B) 59%
(C) 590%
(D) 5900%

49. Round 0.4382 to the nearest hundredth.

(A) 0.4
(B) 0.43
(C) 0.438
(D) 0.44

50. Round 37.026 to the nearest tenth.

(A) 37.0
(B) 37.03
(C) 37.1
(D) 40

51. Round 23,674 to the nearest thousand.

(A) 24,000
(B) 23,700
(C) 23,000
(D) 20,000

52. Which of the following is an even number?

(A) 225
(B) 233
(C) 367
(D) 390

53. $5^3 =$

(A) 3×5
(B) $5 \times 5 \times 5$
(C) $5 + 5 + 5$
(D) $3 \times 3 \times 3 \times 3 \times 3$

54. $9 \times 0 =$

(A) -9

(B) 0

(C) $\frac{1}{9}$

(D) 9

55. If $7 + N = 7$, then $N =$

(A) 0

(B) $\frac{1}{7}$

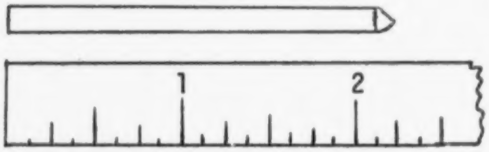
(C) 1

(D) 7

56. If $95 + N = 95$, then $N =$

(A) -95
(B) 0
(C) 1
(D) 95

57.



The length in inches of the pencil shown above is about

(A) $2\frac{1}{8}$

(B) $2\frac{2}{8}$

(C) $2\frac{3}{8}$

(D) $2\frac{4}{8}$

58. The area of a floor would most likely be given in

(A) feet
(B) yards
(C) square feet
(D) cubic feet

59. 2 pounds 5 ounces =

(A) 25 ounces
(B) 29 ounces
(C) 32 ounces
(D) 37 ounces

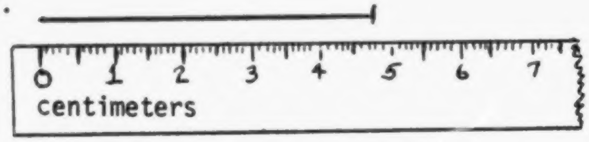
60. Which represents the greatest rise in temperature?

(A) from -4° to 8°
(B) from 4° to 8°
(C) from -2° to 8°
(D) from 2° to 8°

61. 5002 meters is about

(A) 0.5 kilometers
(B) 5 kilometers
(C) 50 kilometers
(D) 500 kilometers

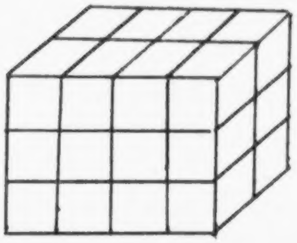
62.



In the figure above, the length of the bar is

(A) 4.2 cm
(B) 4.3 cm
(C) 4.7 cm
(D) 5.2 cm

63.



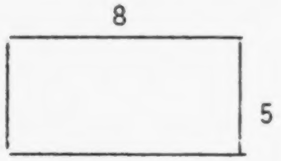
The block shown above is made of 1-centimeter cubes. The volume of the block is how many cubic centimeters?

(A) 9
(B) 12
(C) 24
(D) 26

64. Which of the following is a measure of weight?

(A) kilometer
(B) liter
(C) degree
(D) kilogram

65.



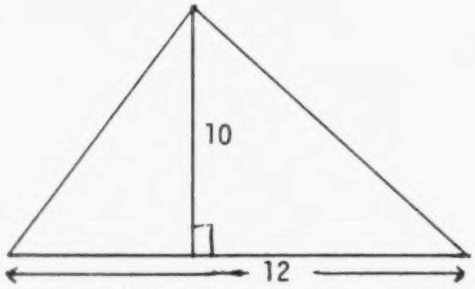
The formula for the area of a rectangle is A = 1 x w. What is the area of the rectangle above?

(A) 13
(B) 20
(C) 26
(D) 40

66. If the side of the square below is 9, then the area of the square is

(A) 11
(B) 18
(C) 36
(D) 81

67.



Area = ½ x base x height

The area of the triangle above is

(A) 11
(B) 30
(C) 60
(D) 120

68. The formula for the area of a circle is $A = \pi \times r^2$ where r is the radius of the circle.

If $\frac{22}{7}$ is used as the value of π, what is the area of a circle with radius 7?

(A) 22
(B) 44
(C) 154
(D) 484

69. Tom worked a 10½ hour shift. If he started at 4:00 p.m., what time did he finish?

(A) 2:30 a.m.
(B) 4:30 a.m.
(C) 6:00 a.m.
(D) 10:30 a.m.

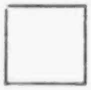
70. Alice bought nail polish for $1.87, tax included. Which is her correct change from a $5.00 bill?

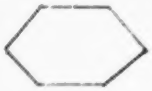
(A) 3 pennies, 1 dime, 3 dollars
(B) 3 pennies, 1 dime, 4 dollars
(C) 7 pennies, 1 dime, 3 dollars
(D) 7 pennies, 8 dimes, 1 dollar

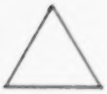
71. A crate holds $4\frac{1}{2}$ dozen oranges. How many oranges does it hold?

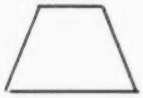
(A) 27
(B) 45
(C) 50
(D) 54

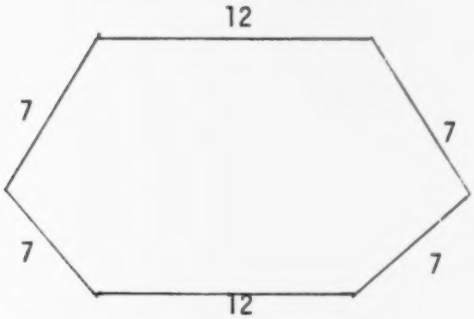
72. Which figure contains right angles?

(A)


(B)


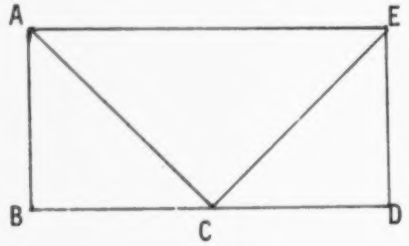
(C)


(D)


73.


What is the perimeter of the figure above?

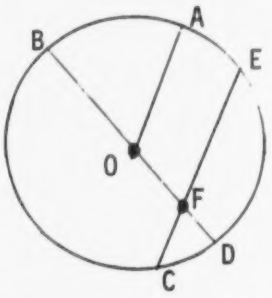
(A) 38
(B) 52
(C) 62
(D) 66

74.


In the figure above, ABDE is a rectangle. Which segment is parallel to AB?

(A) AC
(B) BD
(C) CE
(D) DE

QUESTIONS 75 and 76 refer to the following circle:



75. In the circle with center O, which segment is a diameter?

(A) OA
(B) OB
(C) CE
(D) BD

76. Which segment is a radius?

(A) CF
(B) CE
(C) OA
(D) BF

77. If the radius of a circle is 8, then its diameter is

(A) ½ x 8
(B) 2 x 8
(C) 3.14 x 8
(D) 8 x 8

QUESTIONS 78 - 80 refer to the following table.

TABLE USED TO DETERMINE THE DEDUCTION FOR SALES TAX
FOR NEW JERSEY RESIDENTS

INCOME	Family Size (persons) 4 or under	 5 or over
Under $3,000	$24	$31
$3,000 - $3,999	33	40
$4,000 - $4,999	42	49
$5,000 - $5,999	50	58
$6,000 - $6,999	58	67
$7,000 - $7,999	66	75
$8,000 - $8,999	74	83

78. How much can a New Jersey family of three deduct for sales tax if its total income is $7,200 for the year?

(A) $22
(B) $58
(C) $66
(D) $75

79. A New Jersey man with a wife and three children has a family income of $8,500 for the year. How much can he deduct for sales tax?

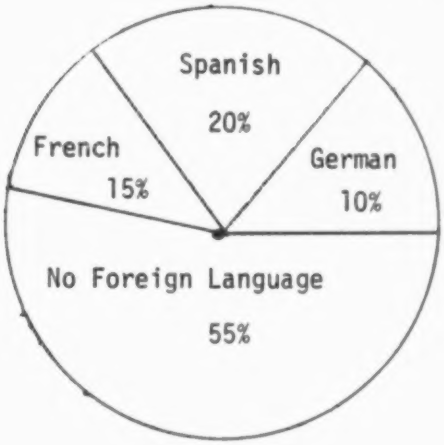
(A) $415
(B) $83
(C) $75
(D) $74

80. Which of the following New Jersey families can deduct the most for sales tax?

(A) A family with 3 and an annual income of $7,800
(B) A family with 2 and an annual income of $8,000
(C) A family with 4 and an annual income of $8,800
(D) A family with 5 and an annual income of $7,500

QUESTIONS 81-83 refer to the following graph:

PER CENT OF KESSLER HIGH SCHOOL STUDENTS WHO
STUDY EACH OF THE THREE LANGUAGES OFFERED



81. What per cent of the students who go to Kessler study a foreign language?

    (A) 25%
    (B) 30%
    (C) 35%
    (D) 45%

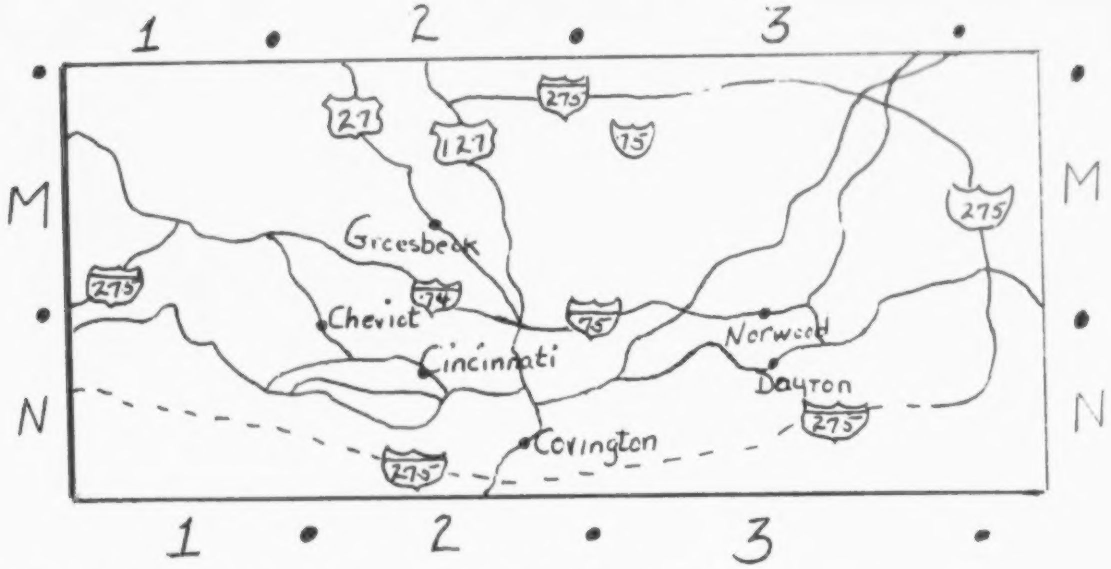
82. If there are 2,000 students at Kessler, how many of them study French?

    (A) 150
    (B) 200
    (C) 300
    (D) 400

83. Which of the following is true?

    (A) More students study German than study either French or Spanish.
    (B) One-fourth of the students study Spanish.
    (C) More than half of the students study a foreign language.
    (D) Twice as many of the students study Spanish as study German.

Test 4, Continued


1
2
3
M
N
M
N
27
127
275
75
275
275
74
75
275
275
Groesbeck
Cheviot
Cincinnati
Norwood
Dayton
Covington

84. On the map above, Groesbeck is located in the M-2 region. Which of the following highways goes through Groesbeck?

(A) (B)

(C) (D)

85. At an annual interest rate of 8%, what is the simple interest on a $4,000 loan for 2 years?

(A) $32
(B) $64
(C) $320
(D) $640

86. If the sales tax rate is 5 cents per $1.00, what is the sales tax due on a $22.00 calculator?

(A) $0.11
(B) $1.10
(C) $11.00
(D) $23.00

87. What is the price of a $9.00 whirt after a 15% discount?

(A) $1.35
(B) $7.65
(C) $8.85
(D) $10.35

88. In 4 weeks Juan earned $24, $28, $34 and $34 respectively, on his part-time job. What were his average weekly earnings?

(A) $28.00
(B) $28.67
(C) $30.00
(D) $34.00

89. A machine that produces 60 parts in 30 minutes will produce 20 parts in

(A) 15 minutes
(B) 10 minutes
(C) 3 minutes
(D) 2 minutes

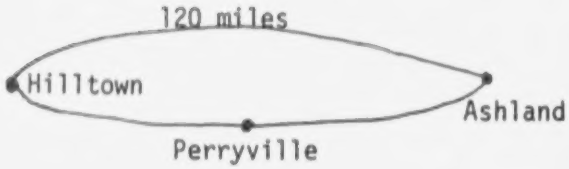
90. The senior class must raise a total of $2,075 for a class trip. If the class netted $1,348 from a hoagie sale, how much more does the class need?

(A) $727
(B) $737
(C) $1,333
(D) $3,423

91. To raise money, a class bought 600 pounds of nuts at $0.90 a pound and sold them all for $1.40 a pound. What was the profit?

(A) $300
(B) $540
(C) $840
(D) $1,380

92.



The distance from Hilltown to Ashland is 120 miles. About how far is it from Perryville to Ashville?

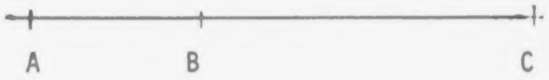
(A) 40 miles
(B) 60 miles
(C) 80 miles
(D) 100 miles

93. Jean drove 418 miles in 7 hours and 5 minutes. Which gives the best estimate of her average speed in miles per hour?

(A) 400 ÷ 5
(B) 400 ÷ 8
(C) 420 ÷ 5
(D) 420 ÷ 7

94. If the figure below is drawn to scale and the distance from A to C represents 30 miles, then the distance from A to B represents about

(A) 10 miles
(B) 15 miles
(C) 20 miles
(D) 60 miles



95. 5 is 25% of what number?

(A) 1.25
(B) 5
(C) 20
(D) 125

I. PROGRAM TITLE - "Addition of Decimals"

II. PROGRAM DESCRIPTION
    A. Students will view a brief tutorial section.
    B. Students will have practice examples to perform prior to testing.
    C. Students will add decimal problems with three addends (one addend will always be a whole number).
    D. Students will be tested on three vocationally-oriented word problems.
    E. Teacher has ability to use "s" key for instant progress report any time during testing.
    F. All problems are randomly generated.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
    A. Peer Tutoring Reference Guide
    B. Worksheet - Addition of Decimals
    C. Application Word Problems
    D. Additional Sources
        1. Merwin J. Lyung et al., Career Mathematics (Boston: Houghton Mifflin Co., 1974), Chapter 4, pp. 106-108.
        2. Merwin Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley Co., 1980), pp. 22-23.

V. SKILLS NEEDED

Knowledge of decimal numeration system (place value) and ability to add whole numbers.

```
1 '**********************************************************
2 '************ ADDITION OF DECIMAL NUMERALS ****************
3 '**************     WRITTEN  BY         *******************
4 '******  M. MCNEARNEY, M. MCALISTER, J. DALY     ***********
5 '************** FOR COMP. ASS. VOC. MATH *******************
6 '**************       MARCH 1981        *******************
7 '**********************************************************
8 '*************** SUBROUTINES TO REMEMBER  ******************
9 '**  MENU (4000), TIME DELAY (5000), 6000 (CONT & TEACHER) **
10 '** TEACHER REPORT (6500), DATA (8000), SCORING (5500)
          **
18 CLEAR 200
19 DIM D$(54)
20 FOR N = 1 TO 5
25   READ R$(N)
30 NEXT
35 FOR Q=1 TO 14:READ D$(Q):NEXT
95 '**********************************************************
96 '***************    TUTORIAL ON ADDITION  *****************
97 '**********************************************************
100 CLS
110 PRINT@ 320, "TODAY'S TOPIC WILL BE ADDITION OF DECIMAL NUMERAL
S"
120 PRINT@448, " ";:INPUT "PLEASE TYPE IN YOUR NAME";A$
130 GOSUB 6000
140 CLS
150 PRINT@384,A$;:INPUT ",  DO YOU NEED A LITTLE REVIEW IN THIS AR
EA";A1$
160 IF A1$ = "NO" GOTO 285
170 CLS
180 PRINT@64, "LET'S CONSIDER ADDING 2 DECIMAL NUMERALS
185 PRINT@ 210, "4.009    +    333.6"
187 GOSUB 5000
190 FOR N=1 TO 25:PRINT@338, "
 ":PRINT@330, "FIRST - LINE UP THE DECIMAL POINTS! ":NEXT
192 GOSUB 5000
195 FOR N = 1 TO 25:PRINT@467, "
 ":PRINT@458, "SECOND - ADD AS WITH WHOLE NUMBERS!":NEXT
198 GOSUB 5000
200 FOR N = 1 TO 25:PRINT@594, "
                    ":PRINT@586, "THIRD - PLACE POINT IN ANSWER BE
LOW POINTS IN PROBLEM.":NEXT
202 GOSUB 5000
204 PRINT@728, "4.009
206 PRINT@788, "+ 333.6";
208 PRINT@853,STRING$(8,CHR$(45));
210 GOSUB 5000
```

```
212 PRINT@740, "YOU CAN ADD ZEROS";
214 PRINT@804, "AFTER DECIMAL POINT";
216 FOR N = 1 TO 35:PRINT@795, "       ":PRINT@795, "00":NEXT
217 PRINT @853,STRING$(8,CHR$(45))
218 GOSUB 5000
219 PRINT@918, "337.609       THIS IS THE SUM."
220 GOSUB 6000
222 CLS
224 PRINT@64, "IT IS VERY IMPORTANT TO REMEMBER TO LINE UP THE DEC
IMALS !!"
225 GOSUB 5000
226 PRINT@192, "WHAT HAPPENS WHEN ONE OF THE NUMBERS IS A WHOLE NU
MBER?"
228 GOSUB 5000
230 PRINT@256, "FOR EXAMPLE     2.5 + 111.345 + 33"
232 GOSUB 5000
234 FOR N = 1 TO 25:PRINT@345, "DON'T WORRY,"A$" !!!":PRINT@345, "
                                             ":NEXT
235 PRINT@384, "EVEN THOUGH YOU DO NOT SEE IT, 33 HAS A DECIMAL PO
INT !"
237 GOSUB 5000
239 GOSUB 5000
240 PRINT@512, "LOOK UP AT THE 33 IN THE EXAMPLE AND I'LL SHOW YOU
"
242 FOR N = 1 TO 500:NEXT
244 FOR N = 1 TO 50:PRINT@290, ". ":FOR F=1 TO 35:NEXT:PRINT@290,
" ":NEXT
246 PRINT@640, "EVERY WHOLE NUMBER HAS A DECIMAL POINT BEHIND IT'S
 LAST DIGIT."
248 PRINT@768, "THE PROBLEM SET UP IS
250 PRINT@793, "   2.500";
252 PRINT@857, " 111.345";
253 PRINT@921, " +33.000";
254 PRINT@985,STRING$(8,CHR$(45));
255 GOSUB 5000
256 PRINT@805, "WHAT IS THE SUM ";:INPUT S
260 IF S = 146.845 THEN PRINT@995, "TERRIFIC, "A$ ELSE PRINT@995,
"THE CORRECT SUM IS 146.845"
262 GOSUB 6000
264 CLS
266 PRINT@64, "TRY THESE EXAMPLES
267 FOR N= 1 TO 3
268 A = RND(25)/10:B = RND(999)/1000: C = RND(999)+RND(99)/100:D =
 RND(99)
270 PRINT                       A  "+"  B  "+"   C  "+"  D
272 INPUT"                               THE SUM IS ";S$
273 S2=INT(((A+B+C+D)+.0005)*1000)/1000:S2$ = STR$(S2)
274 IF VAL(S$) = VAL(S2$) THEN PRINT "GREAT, "A$ ELSE PRINT"SORRY,
 "A$", THE SUM IS"S2
275 PRINT
276 NEXT
```

```
278 GOSUB 6000
280 CLS
282 PRINT@256, " ":INPUT"WOULD YOU LIKE THREE MORE PROBLEMS";D$
284 IF D$ = "YES"GOTO 264
285 CLS
286 PRINT@384, "GET READY FOR THE QUIZ, "A$
288 GOSUB 6000
290 CLS
295 '*********************************************************
296 '************  QUIZ ON ADDING DECIMALS  *****************
297 '*********************************************************
299 C=0:N=O
300 FOR Q = 1 TO 20
310     PRINT@180, "PROB. #"Q
320   A = RND(999)/100:B = RND(999)/10+RND(99):C =RND(999)/1000:D
=RND(99)
322 A1$=STR$(A):B1$=STR$(B):C1$=STR$(C):D1$=STR$(D)
324 IF LEN(A1$)>6 OR LEN(B1$)>6 OR LEN(C1$)>6 OR LEN(D1$)>6 GOTO 3
20
330 PRINT@390, A "+" B "+" C "+" D
340 PRINT@530,," ";:INPUT "THE SUM IS";D$
350 GOSUB 5500
360 GOSUB 6000
365 CLS
370 NEXT
375 CLS
380 PRINT@384, A$", YOUR SCORE FOR THE QUIZ IS"(T/20)*100" %"
385 PRINT@512, "BE SURE TO GET THIS RECORDED BY THE TEACHER"
390 PRINT@640, "GET READY FOR THE VOCATIONAL QUIZ ON THIS TOPIC."
400 GOSUB 6000
4000 CLS
4010 PRINT@30, "MENU"
4020 PRINT@275, "1";TAB(25); "AUTOMOTIVE"
4030 PRINT@339, "2";TAB(25); "BEAUTY CULTURE"
4040 PRINT@403, "3";TAB(25); "CLIMATE CONTROL"
4050 PRINT@467, "4";TAB(25); "ELECTRICAL"
4060 PRINT@531, "5";TAB(25); "MED. DENT.TECH."
4070 PRINT@595, "6";TAB(25); "REC. VECHICLES"
4080 PRINT@659, "7";TAB(25); "BUILDING TRADES"
4090 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
4999 GOTO 6999
5000 FOR N=1 TO 1000:NEXT:RETURN
5500 '*********************************************************
5501 '*************   SCORING THE QUIZ  **********************
5509 D1 = INT(((A+B+C+D)+.0005)*1000)/1000:D1$ = STR$(D1)
5510 IF VAL(D$) =VAL(D1$):X = RND(5):FOR N=1 TO 10: PRINT@730,"
                   ":PRINT@730, R$(X):NEXT:T = T+1::ELSE PRINT@70
4,"SORRY, "A$", THE CORRECT ANSWER IS"D1
5515 RETURN
6000 PRINT@ 960, "PRESS C TO CONTINUE."
```

```
6001 I$ = INKEY$: IF I$ = "C" RETURN
6002  IF I$ = "S" THEN GOTO 6500 ELSE 6001
6500 CLS:PRINT@512, "YOU HAD "T" PROBLEMS OUT OF"Q" CORRECT FOR A
SCORE OF"(T/Q)*100"%"
6501 IF H=2 END
6502 PRINT@576, "TO CONTINUE ENTER 'C'"
6504 PRINT@640, "TO GO TO THE MENU ENTER 'M'"
6506 PRINT@704, "TO END ENTER 'E'"
6508 INPUT Z$
6510 IF Z$ = "C" RETURN
6512 IF Z$ = "M" CLS:GOTO 4000
6514 IF Z$ = "E" END
6996 '**********************************************************
6997 '***************  VOCATIONAL  QUIZ   **********************
6998 '**********************************************************
6999 A=RND(999)/100:B=RND(99)/10:C=RND(9)/10:D=RND(9)
7000 T=0:CLS:PRINT"A PACKAGE CONTAINING ";:PRINT D$(Q):PRINT"IS GO
ING TO BE SENT TO A CUSTOMER VIA AIRMAIL.":PRINT:PRINT"WHAT IS THE
 TOTAL WEIGHT OF THE PACKAGE IF THEY EACH WEIGH "A"KG, "B"KG, "C"K
G, AND "D"KG";:INPUT D$
7010 GOSUB 5500
7011 GOSUB 6000
7049 A=RND(30)/10:B=RND(9)/10:C=RND(10)+RND(10)/10:D=RND(10)
7050 CLS:PRINT"MANY ";:PRINT D$(Q+7):PRINT"JOBS REQUIRE ESTIMATES
OF THE TIME THEY WILL REQUIRE.":PRINT"THE LABOR CHARGE IS FIXED BY
 A JOB REFERENCE MANUAL.":PRINT:PRINT"HOW MANY HOURS WOULD 4 JOBS
TOTAL IF THEY TOOK"A"HRS,"B"HRS,"C"HRS, AND"D"HRS.";:INPUT D$
7060 GOSUB 5500
7061 GOSUB 6000
7099 A=RND(99)+RND(99)/100+RND(99)/100:B=RND(25):C=RND(9)+RND(99)/
100+RND(99)/100:D=RND(99)/100+RND(99)/100
7100 CLS:PRINT"AN ESENTIAL PART OF ANY BILL IS TO FIGURE OUT THE C
OST.":PRINT"WHAT WOULD THE TOTAL BILL BE IF THE LINE ITEMS COST -
          $"A", $"B", $"C", AND $"D;:INPUT D$:GOSUB5500
7111 GOSUB 6000
7500 CLS:Q=3:PRINT@384,"YOUR SCORE FOR THIS SECTION IS"(T/3)*100"
%":GOSUB 6000
8000 DATA "TERRIFIC !!!","GOOD WORK !!!", "YOU'RE GREAT !!","LOVE
IT !!!","EXCELLENT !!"
9000 DATA ENGINE PARTS,HAIR DRYER COMPONENTS,AIR COMPRESSORS,TRANS
FORMERS,CENTRIFUGES,CUSTOM SUN ROOFS,DRILL BITS
9010 DATA ENGINE OVER HALL,HAIR PERMANENT,INSTALLATION OF WATERHEA
TER,REWIRING,ROOT CANAL,BOAT REPAINTING,HOME IMPROVEMENT
```

ADDITION OF DECIMALS

Peer Tutoring Reference Guide

Let's consider adding just 2 decimal numerals together, such as 4.009 and 333.6.

There are 3 simple rules to follow:

1. Line up the decimal points one beneath the other in each numeral.
2. Add, as with whole numbers.
3. Place point in answer below points in problem.

The problem would look like this:

$$\begin{array}{r} 4.009 \\ +333.6 \\ \hline \end{array}$$

If the open spaces occur when lining up decimal points, you may add zeros to fill in.

The problem would then look like:

$$\begin{array}{r} 4.009 \\ +333.600 \\ \hline 337.609 \end{array}$$ is the SUM

It is important to line up the decimals before
attempting to add.

What would happen if one of the addends is a whole number?

For example:

2.5 + 111.345 + 33

Don't worry, for every whole number has a decimal point behind its last digit, such as

2.5 + 111.345 + 33.0

Peer Tutoring Reference Guide, Continued

So, when the decimal points are lined up and the zeros are inserted, the problem looks like:

$$\begin{array}{r} 2.500 \\ 111.345 \\ +\ 33.000 \\ \hline 146.845 \end{array} \text{ is the } \underline{\text{SUM}}$$

No matter how many addends in a problem, remember the three original rules:

1. line up addends by lining up decimal points
2. add as with whole numbers
3. be sure to bring the decimal point down below the others in the sum

ADDITION OF DECIMALS

Worksheet

Compute the sums.

1. 4.265 + 923.8 + 35

____

2. 71.06 + 3.245 + 79

____

3. 296.1 + 3.296 + .89

____

4. 42.165 + 2.938 + 4

____

5. 300 + 7.685 + 2.986

____

6. 25.6 + 92.46 + 2.146

____

7. 929.1 + 3.76 + 5

____

8. 3296.7 + 2.93 + 5.126

____

9. 7.96 + 328.5 + 2.6

____

10. 5.129 + 4,296 + 3.5

____

11. 7.68 + 32.968 + 112

____

12. 4.8 + 3.684 + 2,000

____

13. 7.98 + 32.96 + 5.861

____

14. 293 + 72.68 + 5.29

____

15. 7.146 + 3.296 + 25

____

16. 88.6 + 5.968 + 125

____

17. .865 + 29.15 + 4.8

____

18. 92.6 + 25.146 + 33

____

19. 100 + 25.6 + 32.468

____

20. 72.6 + 3.985 + 2.1

____

ADDITION OF DECIMALS

Application Word Problems

1. The perimeter of a room is 64'. The molding you have is in 6 pieces of varying lengths. (14.2 ft., 9 ft., 20.6 ft., 15.8 ft., 22 ft., 6.55 ft.) What is their total length? Did you have enough to go around the room?

2. An operator is figuring the total hours worked for a five-day week. The daily figures are 8.6 hrs., 9.25 hrs., 7.75 hrs., 8.4 hrs., and 10 hrs. What is the total for that week?

3. Estimating a repair job is part of a mechanic's duties. If the five phases of one job take 5.6 hrs., 3.2 hrs., 2 hrs., .6 hrs., and 1.3 hrs., respectively, how long will the entire process take?

4. On an experimental circuit, calculate the total voltage if each resistor voltage use is 3.6, 9.9, 10.4 and 8 volts respectively.

5. What is the total weight of the amalgrams used if each weighed 9.8 g, 11.65 g, 8.5 g, and 7 g?

6. In converting your van to be used for camping, you add a sink (52 lbs.), a stove top (14.75 lbs.) and a double bed platform (11.65 lbs.). What is the total weight added to your van?

7. In the kitchen branch duct, what is the total pressure loss if each part of the duct lost .0063, .005, .0055, .0008, .0034 and .0008 respectively along the way?

I. PROGRAM TITLE - "Subtraction of Decimals"

II. PROGRAM DESCRIPTION
   A. Students will view a brief tutorial section.
   B. Students will have an opportunity to practice subtraction of decimals before taking test.
   C. Students will be tested on 20 randomly generated problems.
   D. Students will be tested on 3 vocationally-oriented word problems.
   E. Teacher has ability to have instant progress report at any point during test.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide
   B. Worksheet - Subtraction of Decimals
   C. Application Word Problems
   D. Additional Sources
      1. William W. Rogers, Mathematics for Trade and Industrial Occupations (Morristown, New Jersey: Silver Burdett Co., 1980), Chapter 3, pp. 61-63.
      2. Merwin J. Lyung et al., Career Mathematics (Boston: Houghton Mifflin Co., 1974), Chapter 4, pp. 106-108.

V. SKILLS NEEDED
Understanding of decimal numeration system and ability to subtract whole numbers.

```
1 '************************************************************
2 '***************  SUBTRACTION OF DECIMALS  *******************
3 '***************      WRITTEN   BY           ****************
4 '***************     M. MC ALISTER       *******************
5 '***************     M. MC NEARNEY          ****************
6 '***************       J.  DALY             ****************
7 '***************  COMP. ASS. VOC. MATH     ****************
8 '************************************************************
10 DIM S$(21)
20 FOR N = 1 TO 5
25   READ R$(N)
30 NEXT
35 FOR P = 1 TO 21
40     READ  S$(P)
45 NEXT
100 CLS
110 PRINT@384, "TODAY'S TOPIC WILL BE SUBTRACTION OF DECIMALS"
120 PRINT@512, " ";:INPUT "GOOD MORNING -- WHAT IS YOUR NAME";A$
130 GOSUB 6000
135 CLS
137 PRINT@384, " ";:INPUT "DO YOU WISH A REVIEW OF THIS TOPIC";R1$
138 IF R1$ = "NO" GOTO 1000
139 CLS
140 PRINT@84, "SUBTRACTION OF DECIMALS"
145 PRINT@148,STRING$(23,CHR$(45))
150 PRINT@320, "RULES TO FOLLOW ARE SIMILAR TO ADDITION"
155 FOR N = 1 TO 50:PRINT@460, "
        ":PRINT@455, "1.        1INE UP THE DECIMAL POINTS":NEXT
160 GOSUB 5000
165 FOR N= 1 TO 50:PRINT@588, "
            ":PRINT@583, "2.        SUBTRACT AS WITH WHOLE NUMBERS
":NEXT
170 FOR N = 1 TO 50:PRINT@716, "
                       ":PRINT@711, "3.        PLACE POINT IN ANS
BELOW POINTS IN THE PROBLEM":NEXT
175 GOSUB 5000
183 GOSUB 6000
184 CLS
185 PRINT@64, "OK, "A$", LET'S USE THESE RULES IN THE FOLLOWING"
190 GOSUB 5000
210 PRINT@200, "SUBTRACT 42.93 - 5.056
220 PRINT@350, "42.930":PRINT@414,"-5.056":PRINT@478, STRING$(6,CH
R$(45))
230 GOSUB 5000
240 FOR N=1 TO 30:PRINT@601,"    ":PRINT@580, "IN THIS PROBLEM, tH
E ZERO MUST BE ADDED TO 42.93":NEXT
245 GOSUB 5000
250 PRINT@708, "BE CAREFUL TO DO THE BORROWING CORRECTLY !!!!!"
255 PRINT@836, "WHAT IS THE DIFFERENCE";:INPUT G
```

```
260 IF G = 37.874  PRINT@872, "SUPER, "A$
265 IF G <> 37.874 THEN PRINT@872, "THE ANSWER IS 37.874"
270 GOSUB 6000
275 CLS
280 PRINT@64, "PLEASE TAKE A CAREFUL LOOK AT THIS EXAMPLE, "A$
285 GOSUB 5000
290 PRINT@192, "SUBTRACT   56 - 32.96"
295 GOSUB 5000
300 PRINT@328, "REMEMBER - DECIMAL POINTS ARE BEHIND WHOLE NUMBERS
"
310 FOR X = 3  TO 124:SET(X,13):SET(X,18):NEXT:FOR Y = 13 TO 18:SE
T(3,Y):SET(124,Y):NEXT
320 GOSUB 5000
330 PRINT@448,"IT WOULD BE SET UP AS
335 PRINT@539, "56.00":PRINT@602,"-32.96"
340 PRINT@667, STRING$(6,CHR$(45))
350 PRINT@768, "WHAT IS THE DIFFERENCE";:INPUT G1
355 IF G1 = 23.04 PRINT@800, "CORRECT," A$
360 IF G1<>23.04 PRINT@800, "SORRY, ANSWER IS 23.04"
365 GOSUB 6000
370 CLS
372 '*****************    PRACTICE   EXAMPLES    ***************
375 PRINT@64, "TRY THESE 3 EXAMPLES FOR PRACTICE"
378 FOR N = 1 TO 3
380 A =100 + RND(99)+RND(99)/100:B = RND(90)+ RND(999)/1000
390 A1$ = STR$(A):B1$ = STR$(B)
400 IF LEN(A1$)>6 OR LEN(B1$)>6 GOTO 380
410 PRINT
420 PRINT@256,  A1$   " - "   B1$  " = " ;:INPUT D$:GOSUB 7000
425 GOSUB 6000
430 CLS
435 NEXT
440 CLS
445 PRINT@384, " ";:INPUT  "WOULD YOU LIKE TO DO A FEW MORE PROBLE
MS";R2$
450 IF R2$ = "YES" GOTO 370
460 GOSUB 6000
1000 '***********************************************************
1001 '************  QUIZ ON SUBTRACTION DECIMALS  *************
1002 '***********************************************************
1003 CLS
1004 PRINT@384, "GET READY FOR THE QUIZ, "A$
1005 GOSUB 6000
1007 CLS
1008 C=0:N=0
1010 FOR N=1 TO 20
1015 PRINT@88,"PROBLEM #";N
1020 A=INT((100+RND(99)+RND(99)/100)*10000)/10000:B=INT((RND(90)+R
ND(999)/1000)*100000)/100000
1025 A1$=STR$(A):B1$=STR$(B)
1030 IF LEN(A1$)>8 OR LEN(B1$)>8 GOTO 1020
1035 PRINT
```

```
1037 PRINT@104,"                    "
1040 PRINT@276,  A1$   "  -  "   B1$   " = " ;:INPUT D$:GOSUB 7000
1045 GOSUB 6000
1050 CLS
1055 NEXT
1057 CLS:PRINT@512,"YOU HAD "C" PROBLEMS OUT OF 20 CORRECT FOR A S
CORE OF "(C/20)*100" %"
1058 GOSUB 6000
1060 CLS:PRINT@460,"NOW ON TO THE MENU"
1065 GOSUB 6000
4000 CLS
4010 PRINT@30, "MENU"
4020 PRINT@275, "1";TAB(25); "AUTOMOTIVE"
4030 PRINT@339, "2";TAB(25); "BEAUTY CULTURE"
4040 PRINT@403, "3";TAB(25); "CLIMATE CONTROL"
4050 PRINT@467, "4";TAB(25); "ELECTRICAL"
4060 PRINT@531, "5";TAB(25); "MED. DENT.TECH."
4070 PRINT@595, "6";TAB(25); "REC. VECHICLES"
4080 PRINT@659, "7";TAB(25); "BUILDING TRADES"
4090 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
4094 C=0
4095 GOTO 9000
5000 FOR N = 1 TO 1000:NEXT:RETURN
6000 PRINT@960, "PRESS C TO CONTINUE"
6001 I$=INKEY$:IF I$= "C" THEN RETURN
6002 IF I$="S" THEN GOTO 6500 ELSE 6001
6500 CLS:PRINT@512, "YOU HAD "C" PROBLEM(S) OUT OF"N" CORRECT FOR
A SCORE OF"(C/N)*100"%"
6502 PRINT@576, "TO CONTINUE ENTER 'C'"
6504 PRINT@640, "TO GO TO THE MENU ENTER 'M'"
6506 PRINT@704, "TO END ENTER 'E'"
6508 INPUT Z$
6510 IF Z$ = "C" RETURN
6512 IF Z$ = "M" CLS:GOTO 4000
6514 IF Z$ = "E" END
7000 '************************************************************
7001 '*****************  SCORING THE QUIZ  *******************
7002 '************************************************************
7005 W1=(INT((VAL(A1$)-VAL(B1$)+.000005)*100000))/100000:W1$ =STR$
(W1)
7007 IF VAL(D$)=VAL(W1$):X = RND(5):FOR NJ= 1 TO 10:PRINT@730,"
                         ":PRINT@730,R$(X):NEXT:C = C+1:RETURN
7008  PRINT@715, "SORRY, "A$", THE CORRECT ANSWER IS"W1$
7010 RETURN
8000 DATA "TERRIFIC !!!","GOOD WORK !!!", "YOU'RE GREAT !!","LOVE
IT !!!","EXCELLENT !!"
8100 DATAPOWER LINE CABLE, A HAIR PIECE, A PIECE OF WIRE, A PIECE
OF CABLE,AN ACE BANDAGE , WINDOW CAULKING, A ROOF SHINGLE
8200 DATA A GAS STATION ATTENDANT,A MANICURIST,AN INSULATION INSTA
LLER, AN ELECTRICIAN'S AIDE, A LAB TECHNICIAN, A RV SALESMAN,A SHE
ETROCKER
```

```
8300 DATA BRAKE REPLACEMENT, SALON REPAINTING, CENTRAL AIR CONDITI
ONING, WIRING, DENTURE RECONSTRUCTION, VAN CONVERSION, SHEETROCK A
ND TAPING
9000 A=100 + RND(100):B=RND(99)+RND(99)/100
9001 U$="$$##.##"
9005 A1$ = STR$(A):B1$ = STR$(B)
9010 CLS
9020 PRINT@64, S$(Q) " MEASURES"A1$" CM.
9022 PRINT@128,"IF YOU CUT OFF"B1$" CM."
9024 INPUT "WHAT WILL BE LEFT";D$
9030 GOSUB 7000
9035 GOSUB 6000
9040 CLS
9050 A =75+RND(200)+RND(99)/100:B =RND(50)+RND(99)/100+10
9055 A1$=STR$(A):B1$=STR$(B)
9060 PRINT@128,S$(Q+7)" EARNED ";:PRINT USING U$;VAL(A1$)
9070 PRINT@192, "THE DEDUCTION FOR SAVINGS WAS ";:PRINT USING U$;V
AL(B1$)
9080 PRINT "HOW MUCH WAS LEFT IN THE TAKE HOME PAY"
9082 INPUT "TYPE IN THE ANSWER WITHOUT $   ";D$
9090 GOSUB 7000
9100 GOSUB 6000
9110 CLS
9115 B = RND(9) + RND(9)/10:A = 10+RND(9)
9118 A1$ = STR$(A):B1$ = STR$(B)
9120 PRINT@64, "THE ESTIMATE ON THE "S$(Q+14) " JOB WAS TOO HIGH."
9130 PRINT@128, "IT ONLY TOOK"B1$" HOURS INSTEAD OF"A1$" HOURS."
9140 PRINT@256," ";:INPUT "WHAT WAS THE DIFFERENCE IN ESTIMATES";D
$
9150 GOSUB 7000
9160 GOSUB 6000
9170 CLS
9180 PRINT@320, A$", YOUR SCORE FOR THIS SECTION IS"(C/3)*100" %"
9190 PRINT@448, "BE SURE TO SHOW THIS TO THE TEACHER!!"
9200 GOSUB 6000
9210 CLS
9220 PRINT@256, "TIME TO END THIS LITTLE GET TOGETHER, "A$
9230 PRINT@384, "SEE YOU AT THE NEXT LESSON!!!"
9240 GOTO9240
```

SUBTRACTION OF DECIMALS

Peer Tutoring Reference Guide

The rules to subtraction of decimals are very similar to that of addition of decimals. They are as follows:

1. line up the decimal points
2. subtract as with whole numbers
3. place point in answer below points in the problem

Sample #1

Subtract 42.93 - 5.056

Following rule #1, we have

$$\begin{array}{r} 42.93 \\ -\ 5.056 \\ \hline \end{array}$$

In order to subtract as in whole numbers, we must now stop and be sure to add zeros where digits in certain place values are missing, such as, in the thousandths place in 42.93. Now we have:

$$\begin{array}{r} 42.930 \\ -\ 5.056 \\ \hline \end{array}$$

At this point, subtraction can be done.

Regrouping is necessary -- be careful!!

$$\begin{array}{r} \overset{3}{\cancel{4}}\overset{1}{2}.\overset{8}{\cancel{9}}\overset{12}{\cancel{3}}0 \\ -\ 5.056 \\ \hline 37.874 \end{array}$$

Always check your work by addition before going on to the next problem. Also, make sure rule 3 is adhered to by seeing that the decimal point is brought down into the difference directly beneath the others.

Sample #2

Subtract: 52 - 32.96

When setting up this problem, you must remember that every whole number does have a decimal point. It is located behind the last digit or, more technically said, the one's digit.

Now -- that we know it is there and that zeros may be added to fill in places behind decimal points, we have

$$\begin{array}{r} 56.00 \\ -\ 32.96 \\ \hline 23.04 \end{array}$$

SUBTRACTION OF DECIMALS

Worksheet - Compute the differences

1. 42.6 - 3.92

____

2. 7.654 - 5

____

3. 429.66 - 312.5

____

4. 900.62 - 325.98

____

5. 27.6 - 5.432

____

6. 495 - 325.7

____

7. 1,296 - 324.9

____

8. 3.6 - .92

____

9. 52.786 - 32.9876

____

10. 98.63 - 12.47

____

11. 326.05 - 82.93

____

12. 7,296 - 324.7

____

13. 5.29 - .083

____

14. 80.46 - 2.685

____

15. 3.286 - 1.4

____

16. 863.094 - 121

____

17. 69.284 - .38

____

18. 400 - 32.65

____

19. 75 - 4.8

____

20. 17.86 - 3.296

____

SUBTRACTION OF DECIMALS

Application Word Problems

1. A fitting on a water heater must be repaired. The metal plate that must be installed is 3.598 mm thick. It must be decreased to fit a slot 3.475 mm. How much metal must be removed?

2. Before having a relining of brakes job done on a car, you might wish to get estimates. If you received 2 estimates -- one of $108.25 and the other of $99.95, what would be the differences in cost?

3. If the total weight of 2 castings is 326.92 lbs. and one weighed 148.79 lbs., what would the other weigh?

4. Two nail polishes were being compared. Polish A cost 80.93¢ per ounce and Polish B cost 92.8¢ per ounce. How much more was Polish B per ounce?

5. Gold for fillings totaled 20 g. If 9.82 g was used in one day, what was left in the inventory?

6. The resistance range for a No. 30560 coil is between .35 and .45 ohms. How much is a defective coil off the maximum reading if it reads .486?

7. The estimated cost of building a house is $50,000 and $36,928.56 is being spent on materials. What is the cost of the labor?

I. PROGRAM TITLE - "Multiplication of Decimals

II. PROGRAM DESCRIPTION
   A. Students will view a brief tutorial section.
   B. Students will be able to do infinite amount of practice problems.
   C. Students will solve 10 multiplication of decimal problems.
   D. Students will use skills of multiplication to fill-in a bill in their vocational field.
   E. All problem sections use random generation.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide
   B. Worksheet
   C. Application Word Problems
   D. Additional Sources
      1. Mervin L. Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), Chapter 4, pp. 97-125.
      2. L. Carey Bolster et al., Mathematics in Life (Glenview, Illinois: Scott, Foresman & Co., 1977), Chapter 5, pp. 86-104.

V. SKILLS NEEDED
Knowledge of times tables; skill in multiplication of whole numbers.

```
1 '************************************************************
2 '************     MULTIPLICATION OF DECIMALS  ***************
3 '************          WRITTEN   BY           ***************
4 '************          M. MC NEARNEY          ***************
5 '************          M. MC ALISTER          ***************
6 '************             J. DALY             ***************
7 '************    COMP. ASSISTED VOC.MATH      ***************
8 '************             MAY 1981            ***************
9 '************************************************************
10 DEFDBL Z
11 CLEAR 200
12 DIM R$(11),T$(21)
20 FOR N = 1 TO 11
25    READ R$(N)
30 NEXT
33 FOR N = 1 TO 4
34    READ P$(N)
35 NEXT
36 FOR N= 1 TO 4
37    READ P1$(N)
38 NEXT
39 FOR N = 1 TO 6
40   READ P2$(N)
41 NEXT
42 FOR N = 1 TO 21
43   READ T$(N)
44 NEXT
80 CLS
85 PRINT@400, "MULTIPLICATION OF dECIMALS"
90 FOR X = 10 TO 117:SET(X,13):SET(X,25):NEXT:FOR Y = 13 TO 25:SET
(10,Y):SET(117,Y):NEXT
99 GOSUB 6000
100 CLS
110 PRINT@384, " ";:INPUT "PLEASE TYPE IN YOUR NAME";A$
112 PRINT@512, " ";:INPUT "WOULD YOU LIKE TO REVIEW FIRST";S$
114 IF S$ = "NO" THEN GOTO 580
120 FOR N =1 TO 1000:NEXT
125 CLS
130 PRINT@192, "WELCOME "A$", TO MY LESSON ON MULTIPLICATION OF DE
CIMALS!"
135 GOSUB 5000
140 PRINT@320, "IN ORDER TO DO YOUR BEST ON THE TEST"
145 GOSUB 5000
150 PRINT@465, "1. KNOW YOUR TIMES TABLES"
153 GOSUB 5000
155 PRINT@593, "2. TAKE NOTES ON THE LESSON"
158 GOSUB 5000
160 PRINT@721, "3. DO THE PRACTICE EXAMPLES"
170 GOSUB 6000
180 CLS
190 PRINT@72, "1. mULTIPLY AS WITH WHOLE NUMBERS"
200 GOSUB 5000
```

```
210 PRINT@200, "2. FIND THE SUM OF THE DECIMAL PLACES IN THE FACTO
RS"
220 GOSUB 5000
230 PRINT@328, "3. THIS SUM IS THE NUMBER OF DEC. PLACES IN THE PR
ODUCT"
240 GOSUB 5000
245 PRINT@468, "5.87"
250 PRINT@532, "X6.5";
260 PRINT@596, STRING$(4,CHR$(45));
270 PRINT@476, STRING$(3,CHR$(93));:PRINT"      2 DECIMAL PLACES";
280 GOSUB 5000
290 PRINT@540, STRING$(3,CHR$(93));:PRINT"      1 DECIMAL PLACES";
300 GOSUB 5000
330 FOR X = 4 TO 1 STEP -1
335 PRINT@(659 + X),P$(X);
337 FOR N = 1 TO 700:NEXT
340 NEXT
350 FOR X =4 TO 1 STEP -1
360    PRINT@(722 + X),P1$(X)
365    FOR N = 1 TO 700:NEXT
370 NEXT
380 PRINT@787, STRING$(6,CHR$(45))
420 FOR X =6 TO 1 STEP -1
430     PRINT@(849+X),P2$(X)
440    FOR N = 1 TO 700:NEXT
450 NEXT
460 PRINT@860, STRING$(3,CHR$(93));:PRINT"       3. DECIMAL PLACES
"
470 GOSUB 6000
475 CLS
480 PRINT@64, A$", LET'S LOOK AT ONE MORE PROBLEM!!"
490 GOSUB 5000
500 PRINT@192, "FIND THE PRODUCT OF   456   x   .0002"
510 PRINT@320, "TRY IT YOURSELF AND TYPE IN THE ANSWER.";:INPUT S$
530 PRINT@448, "WELL, HERE IS MY VERSION!!!"
540 GOSUB 5000
545 PRINT@543, "456":PRINT@604,"X.0002"
550 PRINT@669, STRING$(6,CHR$(45)):M$=".0912"
560 PRINT@733,M$;
565 IF VAL(S$) = VAL(M$) THEN PRINT@740, "YOU DID IT, "A$ ELSE PRI
NT@740, "SORRY, "A$
570 GOSUB 5000
572 '***************************************************************
573 '**********       QUIZ ON MULTIPLICATION      ***************
574 '***************************************************************
575 IF VAL(S$) = VAL(M$) THEN PRINT@832, "DO THE NEXT 4 PROBLEMS,
THEN GO TO QUIZ!" ELSE PRINT@832, "BE SURE TO DO A LOT OF PRACTICE
 PROBLEMS!"
580 GOSUB 6000
585 CLS
590 FOR N=1 TO2
593 F = F+1
595 PRINT@64, "PRACTICE PROBLEM #"F
600 A = RND(10)+RND(99)/100:B = RND(9)+RND(9)/10:E = RND(100):D =
RND(99)/10
```

```
                                                                 610 A1$=
STR$(A):B1$=STR$(B):E1$=STR$(E):D1$=STR$(D)
620 IF LEN(A1$)>6 OR LEN(B1$)>6 OR LEN(E1$)>6 OR LEN(D1$)>6 THEN G
OTO 600
625 PRINT
630 PRINT@256, A"        X          "B"     =     ";:INPUTZ$:GOSUB 7
000
635 GOSUB 6000
637 CLS
638 F = F+1
639 PRINT@64, "PRACTICE pROBLEM #"F
640 PRINT@256, E"        X          "D"     =      ";:INPUTZ2$:GOSUB
 7050
645 GOSUB 6000
650 CLS
660 NEXT
700 CLS
712 PRINT@384,"WOULD YOU LIKE TO DO MORE PRACTICE PROBLEMS";:INPUT
 J$
715 IF J$= "YES" THEN GOTO 585
720 CLS
722 C = 0
725 PRINT@448, A$", GET READY FOR THE QUIZ ON MULTIPLICATION!!!"
730 GOSUB 6000
735 CLS
740 FOR T = 1 TO 5
745 G =G+1
750 PRINT@90, "PROB. #"G
755 A = RND(9)+RND(99)/100:B = RND(99)+RND(9)/10:E =RND(99):D =RND
(9)+RND(9)/10
760 A1$=STR$(A):B1$=STR$(B):E1$=STR$(E):D1$=STR$(D)
765 IF LEN(A1$)>6 OR LEN(B1$)>6 OR LEN(E1$)>6 OR LEN(D1$)>6 THEN G
OTO755
767 PRINT
770 PRINT@256, A"        X          "B"     =        ";:INPUT Z :Z$
=STR$(Z)
775 GOSUB 7000
780 GOSUB 6000
790 CLS
800 G = G+1
810 PRINT@90, "PROB. #"G
820 PRINT
830 PRINT@256,E"        X          "D"     =          ";:INPUTZ2:Z2
$ = STR$(Z2)
840 GOSUB 7050
850 GOSUB 6000
855 CLS
860 NEXT
870 PRINT@384, A$", YOUR SCORE FOR THE QUIZ WAS"(C/10)*100" %"
880 PRINT@512, "BE SURE TO GET THIS RECORDED BY THE TEACHER BEFORE
 YOU GO ON!!!"
890 GOSUB 6000
900 CLS
905 C =0
```

```
910 PRINT@384,"HERE WE GO TO TH
E VOCATIONAL QUESTIONS.  DO YOUR BEST!"
920 PRINT@512, "YOU WILL BE GIVEN A BILL WITH 3 ITEMS AND THEIR CO
ST."
930 PRINT@640, "FIGURE OUT THE TOTAL COST FOR EACH ITEM."
940 GOSUB 6000
950 GOTO 4000
1025 V1$=STR$(V1):V2$=STR$(V2):
3996 '**********************************************************
3997 '************       MENU FOR VOCATIONS      ***************
3998 '**********************************************************
4000 CLS
4010 PRINT@30, "MENU"
4020 PRINT@275,"1";TAB(25);"AUTOMOTIVE"
4030 PRINT@339,"2";TAB(25);"BEAUTY CULTURE"
4040 PRINT@403,"3";TAB(25);"CLIMATE CONTROL"
4050 PRINT@467,"4";TAB(25);"ELECTRICAL"
4060 PRINT@531,"5";TAB(25);"MED. DENT. TECH."
4070 PRINT@595,"6";TAB(25);"REC. VEHICLES"
4080 PRINT@659,"7";TAB(25);"BUILDING tRADES"
4090 PRINT@840," ";:INPUT"ENTER THE NUMBER OF YOUR VOCATIONAL FIEL
D";Q
4099 CLS
4100 PRINT@132,"AMT             ITEM               @       COST"
4120 U$ = "##    %                   %   $##.##"
4123 V(1)=RND(10):V1(1)=RND(5)+RND(99)/100:V$(1)=STR$(V(1)):V1$(1)
=STR$(V1(1))
4125 PRINT@323, " ";:PRINT USING U$;V(1),T$(Q),V1(1)
4130 V(2)=RND(10):V1(2)=RND(8)+RND(99)/100:V$(2)=STR$(V(2)):V1$(2)
=STR$(V1(2))
4135 PRINT@451, " ";:PRINT USING U$;V(2),T$(Q+7),V1(2)
4140 V(3)=RND(20):V1(3)=RND(20)+RND(99)/100:V$(3)=STR$(V(3)):V1$(3
)=STR$(V1(3))
4145 PRINT@579, " ";:PRINT USING U$;V(3),T$(Q+14),V1(3)
4150 GOSUB 9000
4160 F$="$$##.##":PRINT@364, " ";:INPUT Z$:N=1:GOSUB 10000:Z$="$"+
Z$:PRINT@367,Z$;:PRINT@365," ";
4165 FOR X = 5 TO 112:SET(X,18):NEXT
4167 FOR Y=19 TO 20:SET(5,Y):SET(17,Y):SET(66,Y):SET(86,Y):SET(112
,Y):NEXT
4170 PRINT@492, " ";:INPUTZ$:N=2:GOSUB 10000:Z$="$"+Z$:PRINT@495,Z
$;:PRINT@493," ";
4175 FOR X = 5 TO 112:SET(X,25):NEXT
4177 FOR Y=24 TO 26 STEP 2:SET(5,Y):SET(17,Y):SET(66,Y):SET(86,Y):
SET(112,Y):NEXT
4180 PRINT@620," ";:INPUTZ$:N=3:GOSUB 10000:Z$="$"+Z$:PRINT@623,Z$
;:PRINT@621," ";
4185 FOR X = 5 TO 112:SET(X,32):NEXT
4187 FOR Y = 30 TO 31:SET(5,Y):SET(17,Y):SET(66,Y):SET(86,Y):SET(1
12,Y):NEXT
4200 GOSUB 6000
4210 CLS
4220 PRINT@384, A$", YOUR SCORE FOR THE VOCATIONAL QUIZ IS"(C/3)*1
00" %"
```

```
4230 PRINT@512, "PLEASE GET THIS GRADE RECORDED BY THE TEACHER!!"
4240 GOSUB 6000
4250 CLS
4260 PRINT@384, "IT HAS BEEN A PLEASURE WORKING FOR YOU, "A$
4270 PRINT@512, "GOOD-BYE FOR NOW!!"
4280 GOTO4280
4999 GOSUB 6000
5000 FOR N= 1 TO 1000:NEXT:RETURN
6000 PRINT@960, "PRESS c TO CONTINUE"
6001 I$ = INKEY$:IF I$ = "C"THEN RETURN
6002 IF I$ = "S" THEN 6500
6003 GOTO 6001
6500 '****************      STOP FEATURE      ******************
6501 CLS
6502 PRINT@512, "YOU HAD "C" PROBLEMS OUT OF "G" CORRECT FOR A SCO
RE OF"(C/G)*100" %"
6503 PRINT@576, "TO CONTINUE ENTER 'C'"
6504 PRINT@640, "TO GO TO THE MENU ENTER 'M'"
6505 PRINT@704, "TO END ENTER 'E'"
6506 INPUT Z$
6507 IF Z$ = "C" RETURN
6508 IF Z$ = "M" CLS:GOTO 4000
6509 IF Z$ = "E" END
7000 '**********************************************************
7001 '**************    SCORING THE QUIZ   *********************
7002 '**********************************************************
7003 W1# = (INT((VAL(A1$)*VAL(B1$)+.000005)*100000))/100000:W1$ =
STR$(W1#)
7008 IF VAL(Z$) = VAL(W1$):X = RND(11):FOR NJ = 1 TO 10:PRINT@730,
 "                           ":PRINT@730, R$(X):NEXT:C = C+1:RETURN
7009 PRINT@715,"SORRY, "A$".  THE CORRECT ANSWER IS"W1$
7010 RETURN
7050 K2 = (INT((VAL(E1$)*VAL(D1$)+.000005)*100000))/100000:K2$ = S
TR$(K2)
7052 IF VAL(Z2$)=VAL(K2$):X = RND(11):FOR NJ = 1 TO 10:PRINT@730,
"                            ":PRINT@730,R$(X):C =C+1:RETURN
7053 PRINT@715, "SORRY, "A$".  THE CORRECT ANSWER IS"K2$
7055 RETURN
8000 '**********************************************************
8001 '**************        DATA LINES      ********************
8002 '**********************************************************
8003 DATA "TERRIFIC!!","GOOD WORK!!","YOU'RE GREAT!!","LOVE IT!!",
"EXCELLENT!!","NICE GOING!!","SUPER!!!","FANTASTIC!!","INCREDIBLE!
!","A-OKAY!!","BEAUTIFUL WORK!!!"
8004 DATA 2,9,3,5
8005 DATA 3,5,2,2
8006 DATA 3,8,.,1,5,5
8007 DATA GASKETS, HAIR BRUSHES,FILTERS,SWITCHES,TEST TUBES,CANS O
F GLUE,BOX OF NAILS
8008 DATA FAN BELTS,HAIR CONDITIONER,DRAIN TROUGH,FUSES,THROAT SWA
BS,SPLASH GUARDS,HAMMERS
```

```
8009 DATA AIR FILTERS, BOXES OF PINS,CONDENSER COILS,CAPACITORS,LA
NCETS, VENT COVERS,BOX OF STAPLES
9000 '***********************************************************
9001 '**********    GRAPHIC OF BILL FOR MENU    ****************
9002 '***********************************************************
9003 FOR X = 5 TO 112:SET(X,4):SET(X,11):SET(X,18):SET(X,25):SET(X
,32):NEXT
9004 FOR Y = 4 TO 32:SET(5,Y):SET(17,Y):SET(66,Y):SET(86,Y):SET(11
2,Y):NEXT
9005 RETURN
10000 '**********************************************************
10010 '*************    SCORING FOR MENU QUIZ    ****************
10020 '**********************************************************
10030 X1#=(INT((VAL(V$(N))*VAL(V1$(N))+.000005)*100000))/100000:X$
=STR$(X1#)
10035 IF LEFT$(Z$,1)="$" THEN Z$=RIGHT$(Z$,(LEN(Z$)-1))
10040 IF VAL(Z$)=VAL(X$):L=RND(11):FOR NJ=1 TO10:PRINT@858,"
                ":PRINT@858,R$(L):NEXT:C=C+1:RETURN
10050 F$="$$##.##":PRINT@843, "SORRY, "A$", THE CORRECT ANSWER IS
";:PRINT USING F$;X1#
10060 RETURN
```

MULTIPLICATION OF DECIMALS

Peer Tutoring Reference Guide

In order to do your best on this section, it would be wise to:

1. know your times tables
2. do as many practice examples as needed

The rules of multiplication of decimals are threefold:

1. multiply as with whole numbers
2. find total of decimal places in all factors
3. this is the number of decimal places in the product (always count in from right to left)

```
   5.87  ← 2 decimal places
  x 6.5  ← 1 decimal places
 ------
   2935
  3522
 ------
 38.155  ← 3 decimal places
```

Let's look at one more problem involving a whole number such as

456 x .0002

Remember that the decimal point is behind all numbers; therefore, 456 has no decimal places

```
     456  ← 0 decimal places
 x .0002  ← 4 decimal places
 -------
   .0912  ← 4 decimal places
```

Do the next four practice problems:

```
1.   4.568          2.    3.256
    x 5.96               x .0506
    ------               -------



3.   .0963          4.   2.768
    x   59               x 56.9
    ------               ------
```

MULTIPLICATION OF DECIMALS

Peer Tutoring Reference Guide, Continued

The answers to the four practice problems are following:

```
1.     4.568    3 decimal places
     x  5.96    2 decimal places
       27408
      41112
     22840
    27.22528    5 decimal places


2.     3.256    3 decimal places
      x.0506    4 decimal places
       19536
     162800
    .1647536    7 decimal places


3.     .0963    4 decimal places
      x   59    0 decimal places
        8667
       4815
      5.6817    4 decimal places


4.     2.768    3 decimal places
      x 56.9    1 decimap place
       24912
      16608
     13840
    157.4992    4 decimal places
```

MULTIPLICATION OF DECIMALS

Worksheet

1. 4.8 x 62.1 = __________

2. .058 x 25 = __________

3. 1.36 x .8 = __________

4. .53 x 17.2 = __________

5. .004 x 9.6 = __________

6. 25.7 x 1.2 = __________

7. .82 x 3.06 = __________

8. 7.15 x .002 = __________

9. 2000 x .75 = __________

10. 9.4 x .083 = __________

11. .19 x 5.367 = __________

12. .02715 x 1.34 = __________

13. 7.081 x .0013 = __________

14. 1.09 x .062 = __________

15. .0598 x .032 = __________

16. 8.9034 x .0076 = __________

17. 4.333 x .006 = __________

18. 62.04 x .9 = __________

19. .1051 x .6 = __________

20. 8.896 x 1.96 = __________

MULTIPLICATION OF DECIMALS

Application Problem

This is a sample bill of the Everything Emporium. Given is the amount and the item's cost. Find the total cost per item.

EVERYTHING EMPORIUM

AMOUNT	ITEM	COST	TOTAL
12	Spark Plugs	$ .89	
36	Boxes of Hair Pin	2.47	
72	Tubes of Caulking	4.89	
55	Dimmer Switches	2.75	
120	Large Gauze Pads	.43	
24	Splash Guards	8.25	
5	T-Suqares	4.96	
4.5	Nails (@ lb.)	1.25	
20.8	Petroleum Jelly (@ oz.)	.59	
20	Roof Vents	24.95	
33	20 Amp Fuses	.63	
75	Air Conditioner Filters	1.11	
10.5	Shampoo (@ liter)	5.60	
4	Tires	56.50	
18	Bags of Cement	6.75	
13	Tongue Depressors (@ doz.)	2.35	
20	Hair Brushes	4.88	

I. PROGRAM TITLE - "Division of Decimals"

II. PROGRAM DESCRIPTION
- A. Students will view a brief tutorial section (refer to Peer Tutoring Reference Guide).
- B. Students will do four practice problems and have ability to do more if necessary on request. All problems are random generated.
- C. Students will be tested with ten random generated problems.
- D. Students use skills in division of decimals to find unit prices of items found in vocational fields.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
- A. Peer Tutoring Reference Guide
- B. Worksheet
- C. Application Word Problems
- D. Additional Sources
  1. Mervin L. Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), Chapter 4, pp. 108-128.
  2. Clyde A. Dilley et al., Mathematics, Modern Concepts and Skills (Lexington, Massachusetts: DC Health and Co., 1974), p. 335.

V. SKILLS NEEDED
Subtraction, multiplication and division of whole numbers; multiplication by powers of 10.

```
1 '**************************************************************
2 '**************      DIVISION OF DECIMALS      *****************
3 '**************        WRITTEN   BY            *****************
4 '**************        M.  MC nEARNEY          *****************
5 '**************        M.  MC ALISTER          *****************
6 '**************           J. DALY              *****************
7 '**************             FOR                *****************
8 '************** COMPUTER ASSISTED VOC MATH     *****************
9 '**************           MAY   1981           *****************
10 '*************************************************************
11 CLEAR 500
12 DIM Q$(21)
20 FOR N = 1 TO 8
25   READ R$(N)
30 NEXT
35 FOR N = 1 TO 21
40    READ Q$(N)
45 NEXT
83 CLS
85 PRINT@406, "DIVISION OF DECIMALS"
90 FOR X = 10 TO 117:SET(X,13):SET(X,25):NEXT:FOR Y = 13 TO 25:SET
(10,Y):SET(117,Y):NEXT
99 FOR N = 1 TO 2000:NEXT
100 '************************************************************
101 '************      TUTORIAL ON DIVISION      ****************
102 '************************************************************
105 CLS
110 PRINT@384, " ";:INPUT "PLEASE TYPE IN YOUR NAME";A$
115 PRINT@512, " ";:INPUT "WOULD YOU LIKE A REVIEW FIRST";B$
120 IF B$= "NO" GOTO 540
121 CLS
122 PRINT@384,"SO THAT YOU CAN GO AT YOUR OWN SPEED, I WILL PAUSE
FREQUENTLY   UNTIL YOU PRESS THE SPACE BAR."
123 GOSUB 6000
125 CLS
130 PRINT@64,"DIVISION OF DECIMALS WILL BE TAUGHT IN TWO PHASES, "
A$
135 PRINT@200, "PHASE  1  -   DIVIDING A DECIMAL BY A WHOLE NUMBER
"
137 GOSUB 5000
140 PRINT@328, "PHASE  2  -   DIVIDING A DECIMAL BY A DECIMAL"
143 GOSUB 5000
145 PRINT@448, A$", YOU SHOULD ALREADY KNOW HOW TO"
150 PRINT@589, "1.  ESTIMATE THE QUOTIENT BEFORE DIVIDING"
153 GOSUB 5000
155 PRINT@717, "2.  MULTIPLY DECIMALS BY POWERS OF 10"
160 PRINT@850,"EX. .012 X 1000 = 12"
165 GOSUB 6000
170 CLS
180 GOSUB 6000
185 CLS
190 PRINT@128, "BEFORE WE DO EXAMPLES, HERE ARE THE PROCEDURES WE
WILL FOLLOW."
195 GOSUB 5000
200 PRINT@256, "bASICALLY, THERE ARE 2 RULES TO FOLLOW"
```

```
210 GOSUB 5000
215 PRINT@512, "2. DIVIDE AS WITH WHOLE NUMBERs
218 GOSUB 5000
220 PRINT@640, "IF A REMAINDER OCCURS, FOLLOW THE DIRECTIONS TO RO
UND OFF THE   QUOTIENT TO THE GIVEN DECIMAL PLACE."
225 PRINT@848,A$", LET'S DO AN EXAMPLE !!!"
230 GOSUB 6000
235 CLS
240 PRINT@143, "DIVIDE     7.04    BY      3"
245 PRINT@400,"3";:PRINT@410,"7.04"
250 GOSUB 1000
255 PRINT@283,CHR$(46);:PRINT@282, "2";
260 GOSUB 1000:GOSUB 5000:PRINT@474,"6";:PRINT@538,STRING$(1,CHR$(
45));:GOSUB 1000
265 GOSUB 5000:PRINT@602,"1";:GOSUB 5000:PRINT@603,"0";:GOSUB 5000
:PRINT@284, "3";:GOSUB 1000
270 GOSUB 5000:PRINT@667,"9";:PRINT@730,STRING$(2,CHR$(45));
275 PRINT@795,"1";:GOSUB 5000:PRINT@796,"4";:GOSUB 5000:PRINT@285,
"4";:PRINT@859,"12";:GOSUB 5000:PRINT@923,STRING$(2,CHR$(45));:PRI
NT@988,"2";
280 PRINT@490, "SINCE THERE IS A RE-";
285 PRINT@554, "MAINDER GREATER THAN";
290 PRINT@618, "1/2, WE WILL ROUND OFF";
300 PRINT@682,"THE QUOTIENT TO  2.35";
400 GOSUB 6000
410 CLS
415 PRINT@64, "NOW WE ARE GOING TO DIVIDE A DECIMAL BY A DECIMAL,
"A$
420 GOSUB 5000
425 PRINT@192, "RULES ARE THE SAME AS BEFORE, BUT REMEMBER"
430 GOSUB 5000
435 FOR N = 1 TO 30:PRINT@333, "
             ":PRINT@333,"ALL DIVISORS MUST BE WHOLE NUMBERS!!":NEX
T
440 GOSUB 5000
445 PRINT@519, "IN ORDER TO DO THIS, WE MUST MULTIPLY THE DIVISOR"
:PRINT@589," AND THE DIVIDEND BY A POWER OF 10."
448 GOSUB 5000
450 PRINT@714, "FOR EXAMPLE  .1647 DIVIDED BY .03   BECOMES"
455 PRINT@778,"16.47 DIVIDED BY 3   WHEN MULTIPLIED BY 100."
460 GOSUB 5000
470 CLS
480 PRINT@64, "LET'S DIVIDE  5.13  DIVIDED BY  .9"
485 PRINT@400,".9";:PRINT@410, "5.13";:GOSUB 1000
490 GOSUB 5000
500 PRINT@518, "REMEMBER ABOUT THE DIVISOR, IT MUST BE A WHOLE NUM
BER!"
505 GOSUB 5000
510 PRINT@646, "LOOK UP ABOVE AND I WILL MULTIPLY BOTH NUMBERS BY
10"
515 FOR N = 1 TO 2000:NEXT:PRINT@400, " ";:PRINT@402,".";:PRINT@41
1," ";:PRINT@410,"51.3";
520 FOR N = 1 TO 1000:NEXT
525 PRINT@778, " ";:INPUT "DO THE DIVISION AND TYPE IN YOUR ANSWER
";D$
530 IF D$="5.7"THEN PRINT@910, "TERRIFIC "A$", YOU ARE OKAY!" ELSE
 PRINT@910, "SORRY "A$", THE ANSWER IS 5.7"
```

```
540 CLS:E=0
541 '****************************************************************
542 '***************    PRACTICE PROBLEMS   *********************
543 PRINT@337, "THERE WILL BE 4 PRACTICE EXAMPLES."
544 PRINT@460, "PLEASE ROUND OFF ALL ANSWERS TO THE 100TH PLACE.":
GOSUB 6000:CLS
545 FOR N2 = 1 TO 2
548      E = E+1
550      PRINT@85, "PRACTICE PROBLEM #"E
552      F=RND(52)+3:G=RND(100)+RND(99)/100
553 F$=STR$(F):G$=STR$(G)
554 IF LEN(F$)>6 OR LEN(G$)>6 THEN GOTO552
555      PRINT@400,F;:PRINT@410,G:GOSUB 1000
557      PRINT@600," ";:INPUT K$
558     GOSUB 7000
559 GOSUB 6000:    CLS
560     E = E+1
562     PRINT@85, "PRACTICE PROBLEM #"E
563 H=RND(99)/100:I=RND(9)+RND(999)/1000:H$=STR$(H):I$=STR$(I):IF
LEN(H$)>6 OR LEN(I$)>6 THEN 563
564     PRINT@397,H;:PRINT@410,I;:GOSUB 1000
566     PRINT@600," ";:INPUT J$
568     GOSUB 7010
570     GOSUB 6000
572     CLS
575 NEXT
580 CLS
583 PRINT@384, "WOULD YOU LIKE TO PRACTICE A LITTLE MORE";:INPUT P
$
584 IF P$="YES" THEN GOTO540
585 CLS
586 '***************************************************************
587 '**********          QUIZ  PROBLEMS          *****************
588 '***************************************************************
590 PRINT@384, "GET READY FOR THE QUIZ, "A$
600 GOSUB 6000
610 CLS
620 PRINT@384,"REMEMBER TO ROUND OFF ALL QUOTIENTS TO 100THS PLACE
."
625 GOSUB 6000:CLS:C = 0
630 FOR N3 = 1 TO 5
635     Q =Q+1
640     PRINT@85, "QUIZ PROBLEM #";Q
645     F = RND(52)+3:G = RND(100)+RND(99)/100:F$=STR$(F):G$=STR$(
G):IF LEN(F$)>6 OR LEN(G$)>6 THEN GOTO 645
650     PRINT@400,F;:PRINT@410,G:GOSUB 1000
655     PRINT@600," ";:INPUT K$
660     GOSUB 7000
665     GOSUB 6000:CLS
670    Q = Q+1
675    PRINT@85,"QUIZ PROBLEM #";Q
680    H = RND(99)/100:I=RND(9)+RND(999)/1000:H$=STR$(H):I$=STR$(I
)
685     IF LEN(H$)>6 OR LEN(I$)>6 THEN GOTO 680
690    PRINT@398,H;:PRINT@410,I:GOSUB 1000
695   PRINT@600," ";:INPUT J$
70
```

```
    700    GOSUB 7010
710    GOSUB 6000
715    CLS
720 NEXT
725 PRINT@384, A$", YOUR SCORE ON THE QUIZ IS"(C/Q)*100" %"
730 PRINT@512, "BE SURE TO GET THIS RECORDED BEFORE GOING ON!!"
735 GOSUB 6000
740 CLS
745 PRINT@192, "THE NEXT SECTION WILL DEAL WITH ITEMS THAT YOU MIG
HT BUY IN YOURVOCATIONAL FIELD.  yOU WILL BE GIVEN AN AMOUNT OF ON
E ITEM AND  THE TOTAL PRICE.  IN ORDER TO FIND THE COST OF EACH IT
EM (UNIT  PRICE), YOU MUST DIVIDE THE TOTAL COST BY THE ";
750 PRINT "AMOUNT PURCHASED. LOOK AT THE EXAMPLE!"
755 PRINT:PRINT"9 AIR CONDITIONERS COST $950"
760 PRINT:PRINT"YOU DIVIDE    $950.00   BY   9  "
765 PRINT"(REMEMBER TO ROUND OFF TO THE NEAREST CENT)"
770 PRINT:PRINT "THE UNIT PRICE IS $105.56"
799 GOSUB 6000
800 GOSUB 4000
1000 FOR X = 40 TO 80:SET(X,15):NEXT:FOR Y = 15 TO 20:SET(40,Y):NE
XT
1001 RETURN
3999 GOSUB 6000
4000 C =0:CLS
4010 PRINT@30, "MENU"
4020 PRINT@275, "1";TAB(25); "AUTOMOTIVE"
4030 PRINT@339, "2";TAB(25); "BEAUTY CULTURE"
4040 PRINT@403, "3";TAB(25); "CLIMATE CONTROL"
4050 PRINT@467, "4";TAB(25); "ELECTRICAL"
4060 PRINT@531, "5";TAB(25); "MED. DENT.TECH."
4070 PRINT@595, "6";TAB(25); "REC. VEHICLES"
4080 PRINT@659, "7";TAB(25); "BUILDING TRADES"
4090 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
4100 CLS
4110 PRINT@192, "WHAT IS THE UNIT PRICE OF THE FOLLOWING ITEM IF"
4120 F= RND(20)+40:G =RND(200)+RND(99)/100+50:F$=STR$(F):G$=STR$(G
):IF LEN(F$)>6 OR LEN(G$)>6 THEN 4120
4130 U$="$$###.##":PRINT@400,F;:PRINT" ";:PRINT Q$(Q)" COST";:PRIN
T USING U$;G
4140 PRINT@529, "THE UNIT PRICE WOULD BE";:INPUT K$
4143 P=2:GOSUB 7000
4160 GOSUB 6000
4165 CLS
4166 PRINT@192, "WHAT IS THE UNIT PRICE OF THE FOLLOWING IF"
4170 H=RND(10)+RND(9)/10:I=RND(99)+50+RND(99)/100:H$=STR$(H):I$=ST
R$(I):IF LEN(H$)>6 OR LEN(I$)>6 THEN GOTO 4170
4180 PRINT@400,H;:PRINT" ";:PRINT Q$(Q+7)" COST";:PRINT USING U$;I
4190 PRINT@529,"THE UNIT PRICE WOULD BE";:INPUT J$
4200 P=1:GOSUB 7010
4210 GOSUB 6000
4220 CLS
4225 PRINT@192," WHAT IS THE UNIT PRICE OF THE FOLLOWING ITEM IF"
4230 F = RND(30)+10:G = G$
```

7

```
4230 F = RND(30)+10:G = RND(100)+25+RND(
99)/100:F$=STR$(F):G$=STR$(G):IF LEN(F$)>6 OR LEN(G$)>6 THEN 4230
4235 PRINT@400,F;:PRINT" ";:PRINT Q$(Q+14)" COST";:PRINT USING U$;
G
4240 PRINT@529, "THE UNIT PRICE WOULD BE";:INPUT K$
4245 P=2:GOSUB 7000
4250 GOSUB 6000
4255 GOSUB 10000
5000 C$ = INKEY$:IF C$=" " THEN RETURN ELSE 5000
6000 PRINT@960, "PRESS C TO CONTINUE"
6001 I$=INKEY$:IF I$ = "C" THEN RETURN
6002 IF I$="S" GOTO 6500 ELSE 6001
6500 CLS:PRINT@512, "YOU HAD "C" PROBLEMS OUT OF"Q" CORRECT FOR A
SCORE OF"(C/Q)*100"%"
6502 PRINT@576, "TO CONTINUE ENTER 'C'"
6504 PRINT@640, "TO GO TO THE MENU ENTER 'M'"
6506 PRINT@704, "TO END ENTER 'E'"
6508 INPUT Z$
6510 IF Z$ = "C" RETURN
6512 IF Z$ = "M" CLS:GOTO 4000
6514 IF Z$ = "E" END
7000 '**********************************************************
7001 '************    SCORING OF PROBLEMS   *****************
7002 '**********************************************************
7003 IF LEFT$(K$,1)="$" THEN K$ =RIGHT$(K$,(LEN(K$)-1))
7005 L=(INT((VAL(G$)/VAL(F$)+.005)*100))/100:L$=STR$(L)
7006 IF VAL(L$)=VAL(K$):X = RND(8):FOR N = 1 TO 10:PRINT@730, "
                             ":PRINT@730,R$(X):NEXT:C = C+1:RETURN
7007 IF P = 2 THEN PRINT@715,"SORRY, EACH OF THE "Q$(Q)" COSTS $"L
$:RETURN: ELSE PRINT@715, "SORRY "A$", THE CORRECT ANSWER IS";L$:R
ETURN
7010 IF LEFT$(J$,1)="$" THEN J$=RIGHT$(J$,(LEN(J$)-1))
7011 M =(INT((VAL(I$)/VAL(H$)+.005)*100))/100:M$=STR$(M)
7015 IF VAL(M$) = VAL(J$):X = RND(8):FOR N = 1 TO 10:PRINT@730,"
                              ":PRINT@730, R$(X):NEXT:C=C+1:RETURN
7020 IF P=1 THEN PRINT@715,"SORRY, "A$", THE UNIT PRICE IS$";M$ EL
SE PRINT@715, "SORRY "A$", THE CORRECT ANSWER IS";M$:RETURN
7025 RETURN
8000 DATA "TERRIFIC !!!","GOOD WORK !!!", "YOU'RE GREAT !!","LOVE
IT !!!","EXCELLENT !!","A OKAY!!!","SUPERB WORK!!","gREAT!!!!"
8005 DATA GASKETS,HAIR BRUSHES,FILTERS,SWITCHES,TEST TUBES,CANS OF
 GLUE,BOXES OF STAPLES
8006 DATA GAL. OF ANTIFREEZE,QTS. OF CONDITIONER,PTS. OF FREON,FEE
T OF WIRE,OZ. OF OINTMENT,SQ.FT. OF INSULATION,LBS. OF NAILS
8007 DATA FAN BELTS, BOXES OF PINS,CONDENSER COILS,CAPACITORS,THRO
AT SWABS,VENT COVERS,HAMMERS
10000 CLS
10010 PRINT@384, "YOUR SCORE IS"(C/3)*100"%, "A$
10020 PRINT@512, "LET THE TEACHER RECORD THIS GRADE BEFORE ENDING.
"
10025 GOSUB 6000
10030 CLS
10040 PRINT@384, "GOOD BYE, "A$".  IT HAS BEEN FUN!!"
10050 GOTO 10050
```

DIVISION OF DECIMALS

Peer Tutoring Reference Guide

The approach we will use is to split division of decimals into two phases:

Phase 1 - dividing a decimal with a whole number

Phase 2 - dividing a decimal with a decimal

Before trying out your skills on division, it would be wise to:

1. practice your times tables until you are very proficient
2. know how to multiply with powers of 10, such as

$$4.26 \times 100 = 426$$
$$.0076 \times 1000 = 7.6$$

PHASE 1

We are now going to divide a decimal numeral by a whole number such as in

$$\begin{array}{r} 2.34 \\ 3\overline{)7.04} \\ \underline{6} \\ \bar{1}\ 0 \\ \underline{9} \\ 14 \\ \underline{12} \\ 2 \end{array}$$

Since the remainder is $\frac{2}{3}$ and this is greater than ½, we round up and the quotient is 2.35

In this problem, you had to be sure that the divisor was a whole number and then you could place the decimal point up above where it is not in the dividend. Next, you would divide as with whole numbers.

When dividing a whole by a whole, you also involve decimals such as in

$5\overline{)\ 3.}$ or $8\overline{)\ 9}$

In this case, you must add zeros after the decimal points in the dividends to extend them to the correct place for dividing. We are rounding off to hundredths, therefore, we will need 3 decimal places.

.600
5) 3.000
3 0
00

Quotient is .60

and

1.125
8)9.000
8
1 0
8
20
16
40
40

Quotient is 1.13

PHASE 2 - Dividing a Decimal by a Decimal

When faced with a divisor that isn't a whole number, we must multiply the divisor and dividend by some power of 10 to make it a whole number.

For example,

.9) 3.6 becomes 9) 36 when each part is multiplied by 10

.09) 3.6 becomes 9) 360 when each part is multiplied by 100

Once the divisor is whole, then you bring up the decimal point and divide as with whole numbers.

Follow the steps in this example:

6.7
‸9‸) 6‸0‸3 (multiply by 10)
5 4
6 3
6 3

the quotient is 6.70 if expressed in hundredths.

DIVISION OF DECIMALS

Worksheet

A. Round off each quotient to nearest tenths.

1. $15\overline{)13}$ 2. $25.4\overline{)54.96}$

3. $.875\overline{).6}$ 4. $.62\overline{)5.9}$

5. $1.1\overline{)20}$

B. Round off each quotient to nearest hundredth.

1. $9\overline{)4}$ 2. $.7\overline{)3}$

3. $.625\overline{).52}$ 4. $.87\overline{)63.5}$ 5. $16.39\overline{)3.94}$

C. Round off each quotient to nearest thousandth.

1. $12\overline{)85.6}$ 2. $2.4\overline{)3000}$

3. $.089\overline{)4.75}$ 4. $1.47\overline{)5.04}$ 5. $7.5\overline{)3.96}$

Worksheet, Continued

D. Round each quotient to the nearest cent.

1. $15\overline{)\$36.95}$

2. $24\overline{)\$183}$

3. $75\overline{)\$2.36}$

4. $126\overline{)\$500}$

5. $3.2\overline{)\$9.63}$

DIVISION OF DECIMALS

Application Problem

In this exercise, your task will be to find the unit price of each item purchased. You will be given the item, how many of the item was purchased and the total cost. You must divide the total cost by the amount of items purchased and then round off the answer to the nearest cent.

AMOUNT	ITEM PURCHASED	UNIT COST	TOTAL COST
24	Boxes of Gauze Pads		$ 40.25
120	Cans of Oils		110.96
60	Bottles of Shampoo		75.00
2	Air Conditioners		426.97
9	Voltage Meters		225.00
4	Tires (motorcycle)		99.00
12	Lancets		76.00
50	Oil Filters		246.50
10	Bay Windows		3,295.00
6	Hair Dryers		750.00
3	Heating Elements		265.15
27	Fuse Boxes		185.17
48	Windshield Wipers		150.46
30	Zinc Oxide Ointment		66.95
8	2" Scissors		43.00
25	Air Duct Covers		150.65
7	4-bulb Light Fixture		86.50
15	Custom Seat Covers		200.00
40	Screwdrivers		99.99
3	Storm Doors		149.50

I. PROGRAM TITLE - "Rounding Numbers"

II. PROGRAM DESCRIPTION
   A. Students will view tutorial sections. (Refer to Peer Tutoring Reference Guide)
   B. Students, given a number, will round it to the nearest thousand, hundred, ten, unit, tenth, hundredth and thousandth as directed.
   C. Students will solve practical application problems that involve rounding.
   D. General sections use data lines.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide
   B. Worksheet
   C. Application Word Problems
   D. Additional Sources
      1. Price et al., Mathematics for Everyday Life (Columbus, Ohio: Charles E. Merrill Publishing Company, 1978), pp. 23-24.
      2. Keedy, Mervin L. et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), Chapter 4, pp. 118-119.
      3. Career Mathematics Industry and the Trader (Boston: Houghton Mifflin Co., 1974), p. 6.

V. SKILLS NEEDED
   Reading numbers and place value.

```
1 '*******************************************************
2 '*********** ROUNDING NUMBERS OFF  *********************
3 '***********     WRITTEN BY        **********************
4 '***********       J.DALY          **********************
5 '***********    M. MCNEARNEY       **********************
6 '*********** FOR COMP. ASS. V.M.   **********************
7 '***********    MARCH    1981      **********************
8 '********************************************************
9 CLEAR500:CLS
10 DIM A3$ (11,7),A4$(21)
11 PRINT @512,"GOOD MORNING, WHAT IS YOUR NAME";:INPUTA$
12 CLS
15 FOR N = 1 TO 11:  FOR R = 1 TO 7
20 READ A3$(N,R)
30 NEXT:NEXT
35 PRINT @512,A$", DO YOU WANT INSTRUCTIONS Y/N";:INPUT J$
36 IF J$ ="Y" GOSUB 7000:CLS:GOTO 35
37 CLS
38 PRINT@448,"YOU WILL NEED TO BE FAMILIAR WITH PLACE VALUE . IF Y
OU ARE NOT  PLEASE HAVE A PAPER AND PENCIL HANDY TO COPY DOWN THE
CHART WHEN IT APPEARS.
                         DO NOT USE COMMAS IN YOUR ANSWERS!"
39 GOSUB 6000
40 CLS
50 DATA, , , , , ,T
51 DATA , , , , , H,H
53 DATAT, , , , ,U,O
54 DATAH,H, , , ,N,U
55 DATAO,U, , , ,D,S
56 DATAU,N, , ,T,R,A
57 DATAS,D, ,U,E,E,N
58 DATAA,R,T,N,N,D,D
59 DATAN,E,E,I,T,T,T
60 DATAD,D,N,T,H,H,H
61 DATAS,S,S,S,S,S,S
70 FOR N=1 TO 11: FOR R=1 TO 7
75 PRINT @(10+64*N+6*R),A3$(N,R);
80 NEXT:NEXT
85 FOR N=1TO4:PRINT@(778+6*N),CHR$(95);:NEXT
86 PRINT@805,"."
87 FORN=1TO3:PRINT@(802+6*N),CHR$(95);:NEXT
90 GOSUB6000
91 CLS
95 PRINT @529, "NOW ONTO THE QUIZ"
96 GOSUB 6000
97 CLS
130 FOR N=1 TO 4:READ R$(N):NEXT
145 FOR Q=1 TO 20
146 PRINT @180,"PROB #"Q
147 PRINT @335 ,"DO NOT USE COMMAS IN YOUR ANSWERS!"
150 X=RND(6):FOR N=1 TO4
155 ON X GOSUB 200,300,400,500,600,700
160 NEXTQ:Q=Q-1
161 GOTO250
```

```
200 Y=RND(9999)*100+1000+RND(100)
205 PRINT @512, "ROUND"Y"TO THE NEAREST THOUSAND.";:INPUT K$
210 Y$=STR$(Y):Y1=LEN(Y$):Y2$=LEFT$(Y$,Y1-2):Y3$=RIGHT$(Y2$,1):IFV
AL(Y3$)>=5 THEN Y4$=LEFT$(Y2$,LEN(Y2$)-1):Y5=VAL(Y4$)+1:Y6$=STR$(Y
5)+"000":ELSE Y6$=LEFT$(Y$,Y1-3)+"000"
215 GOSUB 3000
220 GOSUB 6000
225 CLS:RETURN
250 CLS:PRINT @512, "YOU HAD"C" PROBLEMS OUT OF"Q" CORRECT FOR A S
CORE OF"(C/Q)*100"%"
255 IFQ>=20 THEN PRINT @576,"                              ":ELSEPRINT@57
6,"TO CONTINUE ENTER C"
256 PRINT@640, "TO GO TO THE MENU ENTER M"
257 PRINT @704,"TO END ENTER E"
258 INPUT Z$
259 IF Z$="C"RETURN
260 IF Z$="M" CLS:GOTO 4000
261 IF Z$="E" END
300 Y=RND(9999)*10+100+RND(100)
305 PRINT @512, "ROUND"Y"TO THE NEAREST HUNDRED.";:INPUT K$
310 Y$=STR$(Y):Y1=LEN(Y$):Y2$=LEFT$(Y$,Y1-1):Y3$=RIGHT$(Y2$,1):IF
VAL(Y3$)>=5 THEN Y4$=LEFT$(Y2$,LEN(Y2$)-1):Y5=VAL(Y4$)+1:Y6$=STR$(
Y5)+"00":ELSE Y6$=LEFT$(Y$,Y1-2)+"00"
315 GOSUB 3000
320 GOSUB 6000
325 CLS:RETURN
400 Y=RND(9999)*10+10+RND(10)
405 PRINT @ 512,"ROUND"Y"TO THE NEAREST TEN.";:INPUT K$
410 Y$=STR$(Y):Y1=LEN(Y$):Y3$=RIGHT$(Y$,1):IF VAL(Y3$)>=5 THEN Y4$
=LEFT$(Y$,Y1-1):Y5=VAL(Y4$)+1:Y6$=STR$(Y5)+"0":ELSE Y6$=LEFT$(Y$,Y
1-1)+"0"
415 GOSUB 3000
420 GOSUB 6000
425 CLS:RETURN
500 Y=RND(99)/RND(999)
505 PRINT @512,"ROUND"Y"TO THE NEAREST TENTH";:INPUT K$
510 Y1=Y+.05:Y2=INT(Y1*10):Y6$=STR$(Y2/10)
515 GOSUB 3000
520 GOSUB 6000
525 CLS:RETURN
600 Y=RND(99)/RND(999)
605 PRINT@512,"ROUND"Y"TO THE NEAREST HUNDREDTH";:INPUT K$
610 Y1=Y+.005:Y2=INT(Y1*100):Y6$=STR$(Y2/100)
615 GOSUB3000
620 GOSUB 6000
625 CLS:RETURN
700 Y=RND(99)/RND(999)
705 PRINT @512,"ROUND"Y"TO THE NEAREST THOUSANDTH";:INPUT K$
710 Y1=Y+.0005:Y2=INT(Y1*1000):Y6$=STR$(Y2/1000)
715 GOSUB 3000

720 GOSUB6000
725 CLS:RETURN
3000 IF VAL(K$)=VAL(Y6$):FOR N=1 TO 10:  PRINT @730,"
              ":PRINT @730,R$(RND(4)):NEXT:C=C+1:RETURN:ELSE PRINT "
SORRY, THE CORRECT ANSWER IS"Y6$:RETURN
```

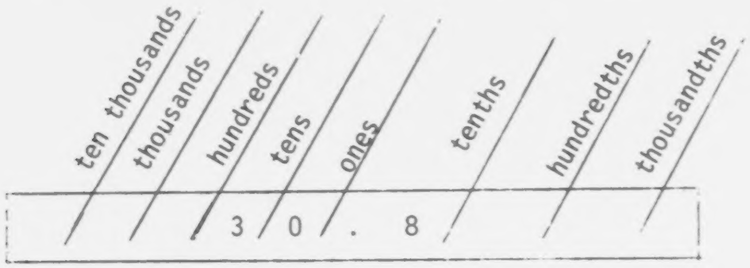
```
3000 IF VAL(K$
)=VAL(Y6$):FOR N=1 TO 10:  PRINT @730,"                          ":
PRINT @730,R$(RND(4)):NEXT:C=C+1:RETURN:ELSE PRINT "SORRY, THE COR
RECT ANSWER IS"Y6$:RETURN
4000 CLS
4010 PRINT@30,"MENU"
4020 PRINT@275,"1"; TAB(25);"AUTOMOTIVE"
4030 PRINT@339,"2";TAB(25);"BEAUTY CULTURE"
4040 PRINT@403,"3";TAB(25);"CLIMATE CONTROL"
4050 PRINT@467,"4";TAB(25);"ELECTRICAL"
4060 PRINT@531,"5";TAB(25);"MED. DENT. TECH."
4070 PRINT@595,"6";TAB(25);"REC. VEHICLE"
4080 PRINT@659,"7";TAB(25);"BUILDING TRADES"
4090 PRINT@840 ," ";:INPUT "ENTER THE NUBER OF YOUR VOCATIONAL FIE
LD";Q1
4095 CLS
4096 C=0:Q=0
4099 FOR N=1 TO 21:READA4$(N):NEXT
4100 Y=RND(999)+100:PRINT@512,"YOU ARE TAKING INVENTORY OF YOUR "A
4$(Q1)". ";:PRINT@576,"YOU HAVE"Y".";:      PRINT@640, "HOW MANY DO
 YOU HAVE TO THE NEAREST HUNDRED";:INPUT K$
4110 Y$=STR$(Y):Y1=LEN(Y$):Y2$=LEFT$(Y$,Y1-1):Y3$=RIGHT$(Y2$,1):IF
 VAL(Y3$)>=5 THEN Y4$=LEFT$(Y2$,LEN(Y2$)-1):Y5=VAL(Y4$)+1:Y6$=STR$
(Y5)+"00":ELSE Y6$=LEFT$(Y$,Y1-2)+"00"
4114 Q=Q+1
4115 GOSUB 3000
4120 GOSUB 6000
4150 CLS
4200 Y=RND(39):PRINT@512,"YOU WANT TO ORDER "A4$(Q1+7)".";:PRINT @
576,"YOU HAVE"Y".";:PRINT"  HOW MANY DO YOU HAVE TO THE NEAREST TE
N";:INPUT K$
4210 Y$=STR$(Y):Y1=LEN(Y$):Y3$=RIGHT$(Y$,1):IF VAL(Y3$)>=5 THEN Y4
$=LEFT$(Y$,Y1-1):Y5=VAL(Y4$)+1:Y6$=STR$(Y5)+"0":ELSE Y6$=LEFT$(Y$,
Y1-1)+"0"
4214 Q=Q+1
4215 GOSUB 3000
4220 GOSUB 6000
4250 CLS
4300 Y=RND(3)/RND(9):PRINT @512,"YOU MEASURE  "A4$(Q1+14)".";:PRIN
T @576,"IT IS"Y" INCHES.":PRINT"  ROUND OFF TO THE NEAREST TENTH O
F AN INCH";:INPUT K$
4310 Y1=Y+.05:Y2=INT(Y1*10):Y6$=STR$(Y2/10)
4314 Q=3
4315 GOSUB3000
4320 GOSUB 6000
4350 CLS
4400 PRINT @ 512,A$", YOUR SCORE FOR THIS SECTION IS,"(C/Q)*100"%"
:PRINT "BYE, HAVE A NICE DAY."
4410 END
6000 PRINT@960,"PRESS C TO CONTINUE."
6001 I$=INKEY$: IF I$="C" RETURN
6002 IF I$="S" GOTO 250 ELSE 6001
7000 CLS:PRINT "WHEN YOU ARE INTERESTED IN ROUNDING A NUMBER YOU W
ILL HAVE NO   DIFFICULTY IF YOU FOLLOW A FEW SIMPLE DIRECTIONS."
7010 FOR N=1 TO1200:NEXT
7020 PRINT" "
```

```
7031 PRINT"FIRST     LOCATE THE PLACE TO BE ROUNDED"
7032 FOR N=1 TO 600: NEXT
7033 PRINT" "
7034 PRINT"SECOND    IF THE DIGIT TO THE RIGHT OF THE NUMBER IS 5
OR MORE             ROUND UP":FOR N =1 TO600 :NEXT
7036 PRINT TAB(28)"EXAMPLE":PRINT TAB(28) STRING$(7,CHR$(95)):PRIN
T" ":IF W1=1 GOTO 7080
7037 PRINT@650,"ROUND 528,761 TO THE NEAREST THOUSAND"
7040 FOR N=1 TO200:PRINT @722," ":PRINT @722,CHR$(91):NEXT
7042 PRINT @774,"WE SEE THAT 8 IS IN THE PLACE TO BE ROUNDED":FOR
N= 1TO2200:NEXT
7045 PRINT @838,"AND 7 IS THE NUMBER TO THE RIGHT"
7050 FOR N=1 TO200:PRINT @660," ":PRINT@660,"7";:NEXT:FOR N=1 TO 2
000:NEXT
7060 PRINT @902,"SO ROUND UP TO 529,000":FOR N=1 TO 2000:NEXT
7070 CLS:W1=1 :GOTO7000
7080 PRINT @650 ,"ROUND 278.291 TO THE NEAREST HUNDREDTH"
7090 FOR N=1 TO 200:PRINT @725 ," " :PRINT @725,CHR$(91): NEXT
7100 PRINT @777,  "WE SEE THAT 9 IS IN THE HUNDREDTHS PLACE": FOR
N=1 TO 2200: NEXT
7110 PRINT @841, "AND 1 IS THE NUMBER TO THE RIGHT OF 9. SINCE 1 I
S LESS"
7120 FOR N=1 TO 200:PRINT@662," " :PRINT@662 ,"1":NEXT :
7130 PRINT @905,"THEN 5 THE 9 REMAINS  AND THE ANSWER IS 278.29"
7200 FOR N=1 TO 3000:NEXT
7500 RETURN
8000 DATA "THAT'S GREAT","GOOD","YOU'RE INCREDIBLE","TERRIFIC"
9000 DATA CANS OF OIL,BOTTLES OF SHAMPOO,CANS OF COOLANT,ELECTRICA
L SWITCHES,BOTTLES OF ASPERIN,LOVE DECALS,BOXES OF NAILS
9001 DATA RADIAL TIRES, HAIR DRYERS, SPECIAL THERMOMETERS,FLOOD LI
GHTS,BED PANS, FIREBIRD DECALS,T SQUARES
9002 DATA A BOLT, A CURLING IRON, INSULATION STRIP,AN ELECTRICAL S
TRIP,A SYRINGE,A PROPELLER, PIECE OF CEDAR
```

ROUNDING NUMBERS

Peer Tutoring Reference Guide

Before we can round numbers, we must understand place value.



When we look at a place value chart, we can quite readily see that the value becomes smaller and smaller as we move to the right: 3 groups of 10 (ten) is much larger than 8 groups of tenths.

When we are interested in rounding a number, we will have no difficulty if we follow a few simple examples:

First Locate the place to be rounded

Second If the digit to the right is 5 or more

round up

If the digit to the right is less than 5

drop the digits to the right

Example

Round to the nearest thousand: 528,761

First Locate the place to be rounded $5\ 2\ \boxed{8}\underset{\rightarrow}{,}\ 7\ 6\ 1$

Second If the digit to the right is 5 or more
The digit is 7 so
round up
529,000

Example 2

Round to the nearest hundredth: 278.291

First Locate the place to be rounded 2 7 8 . 2⑨1
→

Second If the digit to the right is less than 5
drop the digits to the right
278.29

ROUNDING NUMBERS

Worksheet

1. Round to the nearest tenth: 28.769 1. ____________
2. Round to the nearest hundred: 482.01 2. ____________
3. Round to the nearest thousandth: 2.00789 3. ____________
4. Round to the nearest ten: 348.21 4. ____________
5. Round to the nearest hundredth: 2.005 5. ____________
6. Round to the nearest thousandth: .0785 6. ____________
7. Round to the nearest hundredth: 432.970 7. ____________
8. Round to the nearest tenth: 69.96 8. ____________
9. Round to the nearest thousandth: 8.72819 9. ____________
10. Round to the nearest hundredth: 428.755 10. ____________
11. Round to the nearest tenth: 42.081 11. ____________
12. Round to the nearest thousandth: 98.7643 12. ____________
13. Round to the nearest tenth: 72.81 13. ____________
14. Round to the nearest thousandth: 4.7619 14. ____________
15. Round to the nearest hundredth: 28.764 15. ____________
16. Round to the nearest tenth: 5.287 16. ____________
17. Round to the nearest hundred: 92,610 17. ____________
18. Round to the nearest thousandth: .72861 18. ____________
19. Round to the nearest tenth: 96.832 19. ____________
20. Round to the nearest hundredth: 4.875 20. ____________

ROUNDING NUMBERS

Application Word Problems

1. Shomko's Auto Shop carries the largest supply of radial tires in the area. If Shomko has 283 F-15's, how many tires are there to the nearest hundred?

2. A beauty salon operator is taking inventory. If there are 42 bottles of conditioner, how many bottles is that to the nearest ten?

3. A piece of insulation measures 12.125 inches. How thick is it to the nearest hundredth of an inch?

4. You are taking a patient's temperature. If the thermometer reads 99.8, what is it rounded to the nearest one or unit?

5. The width of a propeller is 4.75 feet. What is it to the nearest tenth of a foot?

6. A mason uses 14,284 bricks on a certain job. How many bricks are used to the nearest thousand?

7. A cyclist travels 92.5 miles. How many miles is this to the nearest hundred?

8. A piece of clam shell molding measures 4.725 feet. What is the length of the molding to the nearest hundredth of a foot?

9. The circumference of a headlight is 17.3297 inches. What is the circumference to the nearest thousandth?

10. A refrigeration unit has 4,284 cubic feet. How much is this to the nearest hundred?

I. PROGRAM TITLE - "Equivalent Fractions"

II. PROGRAM DESCRIPTION
    A. Students will be guided through a tutorial section.
    B. Students will work with equivalent fractions.
    C. Students will add fractions with common and unlike denominators.
    D. Data lines are used throughout.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
    A. Peer Tutoring Reference Guide
    B. Worksheets
        1. Finding Equivalent Fractions
        2. Addition of Fractions - Level I
        3. Addition of Fractions - Level II
    C. Additional Sources
        1. Mervin L. Keedy et al., General Mathematics (Melno Park, California: Addison Wesley, 1980), p. 140.
        2. Edwin I. Stein, Refresher Mathematics (Boston: Allyn Bacon Inc., 1980), p. 84, pp 100-105, pp. 146-147.

V. SKILLS NEEDED
    Addition, subtraction, multiplication and division of whole numbers.

```
0 '************************************************************
1 '*****  RULER-EQUIVALENT FRACTIONS-ADDITION OF FRACTIONS ****
2 '***** WRITTEN BY J.DALY, M.MCALISTER, M.MCNEARNEY **********
3 '*****    FOR COMP ASS'T VOC MATH  -  OCT. 1980       *****
4 '************************************************************
5 CLS:CLEAR 100
6 PRINT @512," ";:INPUT "GOOD MORNING, WHAT IS YOUR NAME";A$:CLS
7 DIMA$(20):DIMA(20):DIMB$(20):DIMBW(20):DIMBN(20):DIMBD(20)
8 FOR K=1TO20
10 READ A$(K), A(K)
13 NEXT
20 DATA "2/5 = ?/10",4,"11/12 = /36",33,"7/8 = ?/16",14,"1/2 = ?/3
2",16,"5/6 = ?/18",15,"3/7 = ?/35",15,"2/3 = ?/12",8,"1/12 = ?/36"
,3,"3/4 = ?/20",15,"9/16 = ?/48",27
22 DATA "4/8 = ?/2",1,"16/20 = ?/5",4,"6/9 = ?/3",2,"14/16 = ?/8",
7,"10/15 = ?/3",2,"72/80 = ?/10",9,"20/24 = ?/6",5,"10/16 = ?/8",5
,"48/60 = ?/5",4,"16/32 = ?/2",1
25 DATA "4  1/6 + 1  3/4 =",5,11,12,"2  7/10 + 2  4/5 =",5,1,2,"4
 1/3 + 5  3/8 = ",9,17,24,"1  7/9 + 3  2/3 = ",5,4,9,"7  5/6 +2  2
/3 =",10,1,2,"8  4/9 + 5  1/3 =",13,7,9,"6  1/2 + 4  3/5 =",11,1,1
0
26 DATA "15  1/6 + 4  7/8 =",20,1,24,"9  2/3 + 6  1/8 =",15,19,24,
"12  1/5 + 8  2/3 ",20,13,15,"6  3/4 + 5  9/10 =",12,13,20,"3  5/8
 + 8  7/16 =",12,1,16
27 DATA "3  1/4 + 6  1/4 =",9,1,2,"7  5/12 +5  1/3 =",12,3,4,"7  7
/10 + 5  3/5 =",13,3,10,"4  5/6 + 10  3/4 =",15,7,12,"6  3/8 + 4
2/3 =",11,1,24,"4  3/5 + 6  7/8 =",11,19,40,"4  2/3 + 2  1/4 =",6,
11,12,"9  5/6 + 5  5/6 =",15,2,3
100 FOR X=13TO114:SET(X,12):SET(X,20):NEXT
110 SET(13,13):SET(114,13):SET(13,14):SET(114,14):SET(63,15):SET(1
14,15):SET(13,15)
120 SET (13,16):SET(38,16):SET(63,16):SET(89,16):SET(114,16)
130 SET(13,17):SET(20,17):SET(26,17):SET(32,17):SET(38,17):SET(44,
17):SET(50,17):SET(56,17):SET(63,17):SET(71,17):SET(77,17):SET(83,
17):SET(89,17):SET(95,17):SET(101,17):SET(107,17):SET(114,17)
140 SET(13,18):SET(38,18):SET(63,18):SET(89,18):SET(114,18):SET(13
,19):SET(114,19)
150 SET(14,23):SET(15,23):SET(111,23):SET(112,23):SET(113,23):SET(
114,23)
160 FOR Y = 25 TO 27:SET(14,Y):SET(15,Y):SET(111,Y):NEXT
170 FOR X = 112 TO 114:SET(X,25):SET(X,27)
180 SET(14,24):SET(15,24):SET(114,24)
190 SET(114,25):SET(114,27):SET(113,25):SET(113,27)
191 PRINT @710 ,"THE INCHES ON A RULER ARE DIVIDED INTO 16 EQUAL P
ARTS"
192 FOR Q=1 TO 40
193   RESET(20,17):RESET(26,17):RESET(32,17):RESET(38,17):RESET(44
,17):RESET(50,17):RESET(56,17):RESET(63,17):RESET(71,17):RESET(77,
17):RESET(83,17):RESET(89,17):RESET(95,17):RESET(101,17):RESET(107
,17)
194 SET(20,17):SET(26,17):SET(32,17):SET(38,17):SET(44,17):SET(50,
17):SET(56,17):SET(63,17):SET(71,17):SET(77,17):SET(83,17):SET(89,
17):SET(95,17):SET(101,17):SET(107,17)
```

```
195 NEXT
196 FOR Q=1TO400:PRINT @671,CHR$(91):PRINT @671," ":NEXT
197 PRINT @671, CHR$(91)
198 PRINT @775,"AS WE CAN SEE, 1/2 INCH IS EQUIVALENT TO 8/16 INCH
":FOR X=1 TO 2000:NEXT
199 PRINT @659,CHR$(91):PRINT @671, CHR$(91):PRINT @684,CHR$(91)
200 PRINT @775, "ALSO, 4/16 INCH = 1/4 INCH, AND 12/16 INCH =3/4 I
NCH"
201 FOR X=1 TO 4000:NEXT
202 PRINT @ 775, " WE CAN CLEARLY SEE, IF WE ARE GOING TO USE A RU
LER,"
203 PRINT @ 838,"WE MUST BE ABLE TO EXPRESS FRACTIONS IN EQUIVALEN
T WAYS.
204 FOR X=1TO 4000:NEXT
205 PRINT @ 772,"    WE MUST ALSO KNOW HOW TO ADD, MULTIPLY,DIVIDE
,       "
206 PRINT @838,"                    AND SUBTRACT FRACTIONS.
"
207 FOR X=1 TO 4000:NEXT
208 CLS
209 PRINT @ 448, "THIS LESSON WILL REVIEW EQUIVALENT FRACTIONS AND
 ADDITION OF "
210 PRINT @532," FRACTIONS."
211 PRINT @ 640, "REMEMBER----- ALL YOUR ANSWERS MUST BE IN SIMPLE
ST FORM!!!!!!"
212 PRINT @704, STRING$(64,CHR$(91))
215 GOSUB 3000
216 CLS
1000 PRINT @132,"PLEASE EXPRESS THE FOLLOWING AS EQUIVALENT FRACTI
ONS"
1020 PRINT @336,"EXAMPLE 1     1/2 = ?/4"
1030 PRINT @390,"YOU WILL REPLACE THE ? WITH 2, BECAUSE 1/2 = 2/4"
1040 PRINT @590,"EXAMPLE 2     5/15 = 1/?"
1050 PRINT @645,"YOU WILL REPLACE THE ? WITH 3, BECAUSE 5/15 = 1/3
"
1055 GOSUB 3000
1057 CLS
1220 FOR N=1 TO 20:PRINT@115,"PROB. ";N:PRINT@340, A$(N) :PRINT@46
4,"YOUR ANSWER ";:INPUT A
1230 GOSUB4000
1240 GOSUB3000
1245 CLS
1250 NEXT
1260 PRINT@460, "YOUR SCORE IS " INT((T/20)*100)"%":PRINT@524,"BE
SURE TO HAVE YOUR SCORE RECORDED BEFORE GOING ON"
1270 GOSUB3000
1280 CLS:PRINT@464, "********   PART 2  ********"
1280 CLS:PRINT@464, "********   PART 2  ********"
1290 GOSUB3000
1295 CLS
1300 PRINT@197, "IN THIS SECTION, YOU WILL BE ASKED TO ADD UNLIKE
FRACTIONS."
1310 FOR N=1TO1500:NEXT
1320 PRINT@340,"LET'S LOOK AT A SAMPLE PROBLEM!"
```

```
1330 FORN=1TO1500:NEXT:CLS
1340 PRINT@212, "2  1/4  +  3  2/3"
1350 FORN=1TO1500:NEXT
1360 PRINT@325, "FIRST, WE MUST FIND A COMMON DENOMINATOR FOR 4 AN
D 3"
1370 FOR N=1TO1500:NEXT:PRINT
1380 PRINT@389, "NATURALLY, WE SEE THAT 12 IS THE DENOMINATOR WE W
ANT."
1390 FOR N=1TO1500:NEXT
1400 PRINT@527," 1/4 = 3/12      2/3 = 8/12 "
1410 FOR N=1TO1500:NEXT
1420 PRINT@709, " NOW, LET'S SEE WHAT THE NEW PROBLEM LOOKS LIKE!"
1425 GOSUB3000
1426 CLS
1430 PRINT@212, " 2  3/12  +  3  8/12 "
1440 PRINT@325,"WE FIRST ADD THE NUMERATORS TOGETHER TO GET 11!"
1445 FOR N=1TO1500:NEXT
1450 PRINT:PRINT@389, "WE KEEP THE SAME DENOMINATOR OF 12"
1460 FOR N=1TO1500:NEXT:PRINT:PRINT@453,"NEXT, WE ADD THE 2 AND 3
TO GET 5"
1465 FOR N=1TO1800:NEXT
1470 PRINT:PRINT@662, "THE SUM IS 5  11/12"
1475 PRINT@960," ";:INPUT "DO YOU WISH TO SEE THIS EXAMPLE AGAIN";
D$
1480 IF D$="YES"THEN 1280
1490 CLS:PRINT@140,"THIS IS A QUIZ ON ADDING UNLIKE FRACTIONS"
1500 FOR N=1TO1500:NEXT
1510 PRINT@390, "THE ANSWERS HAVE TO BE TYPED IN THE FOLLOWING MAN
NER."
1520 PRINT@538, "WHOLE NUMBER ?"
1530 PRINT@666, "NUMERATOR ?"
1540 PRINT@794, "DENOMINATOR ?"
1550 GOSUB 3000
1560 CLS
1561 Q=0
1570 FOR N=1TO20:READ B$(N),BW(N),BN(N),BD(N):PRINT@115, "PROB. ";
N:PRINT@340, B$(N)
1580 PRINT@ 468, " ";:INPUT "WHOLE NUMBER";BW
1590 PRINT@596, " ";:INPUT "NUMERATOR";BN
1600 PRINT@724, " ";:INPUT "DENOMINATOR";BD
1610 GOSUB 5000
1620 GOSUB 3000
1630 CLS
1640 NEXT
1650 PRINT @ 460, "YOUR SCORE IS " INT((Q/20)*100)"%": PRINT @ 524
, "BE SURE TO HAVE YOUR TEACHER RECORD YOUR GRADE."
1660 GOSUB 3000
1665 CLS
1700 PRINT @ 460, "GOODBYE, "A$ ", KEEP UP YOUR WORK WITH FRACTION
S":END
3000 PRINT @ 960,"PRESS C TO CONTINUE."
```

```
3001 I$=INKEY$:IFI$="C" THEN RETURN ELSE 3001
4000 IF A=A(N) PRINT @832,"CORRECT":T=T+1:RETURN:ELSE PRINT @832,
"SORRY, THAT IS NOT CORRECT, "A$ ", THE CORRECT ANSWER IS, "A(N):R
ETURN
5000 IF BW=BW(N) AND BN=BN(N) AND BD=BD(N) PRINT @832,"CORRECT":Q=
Q+1:RETURN:ELSE PRINT @832,"SORRY, THAT IS NOT CORRECT, "A$ ", THE
 CORRECT ANSWER IS "BW(N)" "BN(N)"/"BD(N):RETURN
```

EQUIVALENT FRACTIONS

Peer Tutoring Reference Guide

Equivalent Fractions can be defined as fractions that name the same number.

$\frac{1}{2} \quad \frac{5}{10} \quad \frac{20}{40}$ are equivalent fractions

We can check to see if fractions are equivalent by using the cross product method

$$\frac{1}{2} \overset{?}{=} \frac{5}{10}$$

$$\frac{\text{numerator}}{\text{denominator}} = \frac{\text{numerator}}{\text{denominator}}$$

the product of the numerator of the first fraction
and the denominator of the second fraction

equals

the product of the denominator of the first fraction
and the numerator of the second

$$1 \cdot 10 = 2 \cdot 5$$

or

$$10 = 10$$

then the fractions are equivalent

Example I

$$\frac{3}{4} = \frac{}{12}$$

$$\frac{3}{4} = \frac{}{12}$$

$$4 \cdot x = 36$$

This actually says 4 times some number = 36
In order to find the number itself, we must divide both sides by 4

$$\frac{4x}{4} = \frac{36}{4}$$

$$1x = 9$$

We can check our work

$$\frac{3}{4} = \frac{9}{12}$$

does $4 \cdot 9 = 3 \cdot 12$?

$$36 = 36$$

YES, and so $\frac{3}{4} = \frac{9}{12}$ they are equivalent fractions

Example II

$$\frac{2}{9} = \frac{5}{?}$$

Again, we can use cross product or

Product of means = Product of extremes

$$9 \cdot 5 = 2 \cdot x$$

$$45 = 2x$$

again, divide both sides by the number in front of the x and

$$x = 22\tfrac{1}{2}$$

Check your work:

$$\frac{2}{9} = \frac{5}{22\frac{1}{2}}$$

does $9 \cdot 5 = 2 \cdot 22\frac{1}{2}$?

YES, and so these fractions are equivalent

Once we are familiar with equivalent fractions, adding fractions becomes much easier.

Example III

$$\begin{array}{r} 2\,\frac{1}{3} \\ 4\,\frac{1}{6} \\ \hline \end{array}$$

In the example at the right, the denominators are different. Before we can add these mixed numbers, we need to find the lowest common denominator (LCD)

The LCD can be defined as the smallest natural number that can be divided exactly by the denominators of all the given fractions.

In the problem (possibly through inspection) you might see that 6 is the LCD.

And so we can say:

$$\begin{array}{lcl} 2\frac{1}{3} \times \frac{2}{2} & = & \frac{2}{6} \\ 4\frac{1}{6} & = & \frac{1}{6} \\ \hline \multicolumn{3}{c}{6\frac{3}{6} = 6\frac{1}{2}} \end{array}$$

Example IV

$$\begin{array}{l} 2\frac{1}{7} \\ 3\frac{2}{3} \\ 5\frac{1}{42} \\ \hline \end{array}$$

If we fail to see the LCD, we can arrange the denominators in a row Now divide by the smallest number that will divide evenly into the denominators

$$\begin{array}{r|l} 3 & 3,\ \ 42,\ \ 7 \\ \hline 7 & 1,\ \ 14,\ \ 7 \\ \hline & 1,\ \ 2,\ \ 1 \\ \hline \end{array}$$

If there were more than 3 fractions, then we would look for the smallest number that would divide evenly into two or more of the denominators

And so the LCD is

$$\begin{array}{r|l} 3 & 3,\ \ 42,\ \ 7 \\ \hline 7 & 1,\ \ 14,\ \ 7 \\ \hline & 1,\ \ 2,\ \ 1 \\ \hline \end{array}$$

$$3 \times 7 \times 1 \times 2 \times 1 \text{ or } 42$$

So,

$$\begin{array}{llcl} 2\,\frac{1}{7} & \times\ \frac{6}{6} & = & \frac{6}{42} \\[6pt] 3\,\frac{2}{3} & \times\ \frac{14}{14} & = & \frac{28}{42} \\[6pt] 5\,\frac{1}{42} & & & \frac{1}{42} \\ \hline \multicolumn{4}{c}{10\,\frac{35}{42} = 10\,\frac{5}{6}} \end{array}$$

Example V

$$\begin{array}{l} 2\,\frac{2}{3} \\[6pt] 1\,\frac{7}{8} \\[6pt] 5\,\frac{1}{6} \\ \hline \end{array}$$

Again, place the denominators in a row

$$\begin{array}{r|l} 2 & 3,\ \ 8,\ \ 6 \\ \hline 3 & 3,\ \ 4,\ \ 3 \\ \hline & 1,\ \ 4,\ \ 1 \end{array}$$

Now divide by the smallest number that will go into two or more numbers

And so the LCD is

$2 \times 3 \times 1 \times 4 \times 1$ or 24

Now let's use the Lowest Common Denominator of 24

$$\begin{array}{llcl} 2\,\frac{2}{3} & \times\ \frac{8}{8} & = & \frac{16}{24} \\[6pt] 1\,\frac{7}{8} & \times\ \frac{3}{3} & = & \frac{21}{24} \\[6pt] 5\,\frac{1}{6} & \times\ \frac{4}{4} & = & \frac{4}{24} \\ \hline \multicolumn{4}{c}{8\,\frac{41}{24} = 9\,\frac{17}{24}} \end{array}$$

EQUIVALENT FRACTIONS

Worksheet I - Equivalent Fractions

1. $\frac{4}{5} = \frac{n}{20}$

______

2. $\frac{54}{90} = \frac{3}{x}$

______

3. $\frac{4}{9} = \frac{8}{x}$

______

4. $\frac{20}{100} = \frac{n}{50}$

______

5. $\frac{5}{6} = \frac{n}{42}$

______

6. $\frac{7}{9} = \frac{21}{x}$

______

7. $\frac{21}{28} = \frac{7}{x}$

8. $\frac{2}{5} = \frac{7}{x}$

______

9. $\frac{6}{9} = \frac{x}{13}$

______

10. $\frac{5}{4} = \frac{n}{9}$

______

11. $\frac{2}{y} = \frac{6}{10}$

______

12. $\frac{8}{11} = \frac{12}{p}$

______

13. $\frac{15}{20} = \frac{9}{x}$

______

14. $\frac{21}{x} = \frac{\frac{7}{10}}{\frac{1}{2}}$

______

15. $\frac{2.1}{4.2} = \frac{.5}{x}$

______

16. $\frac{x}{.01} = \frac{2}{12}$

______

17. $\frac{.005}{c} = \frac{1.4}{.28}$

______

18. $\frac{10}{r} = \frac{.9}{1.8}$

______

19. $\frac{7}{22} = \frac{.05}{x}$

______

20. $\frac{n}{2\frac{1}{2}} = \frac{16}{\frac{2}{3}}$

______

EQUIVALENT FRACTIONS

Worksheet II - Addition of Mixed Numbers

1. $\begin{array}{r} 2\frac{1}{4} \\ 3\frac{1}{2} \\ \hline \end{array}$

2. $\begin{array}{r} 7\frac{1}{8} \\ 2\frac{9}{10} \\ \hline \end{array}$

3. $\begin{array}{r} 5\frac{1}{3} \\ 2\frac{2}{5} \\ \hline \end{array}$

4. $\begin{array}{r} 6\frac{1}{2} \\ 7\frac{1}{10} \\ \hline \end{array}$

5. $\begin{array}{r} 9\frac{1}{3} \\ 6\frac{2}{7} \\ \hline \end{array}$

6. $\begin{array}{r} 4\frac{6}{14} \\ 5\frac{5}{21} \\ \hline \end{array}$

7. $\begin{array}{r} 9\frac{7}{12} \\ 2\frac{5}{18} \\ \hline \end{array}$

8. $\begin{array}{r} 7\frac{2}{6} \\ 3\frac{9}{48} \\ \hline \end{array}$

9. $\begin{array}{r} 6\frac{4}{5} \\ 4\frac{2}{30} \\ \hline \end{array}$

10. $\begin{array}{r} 2\frac{1}{2} \\ 8\frac{4}{8} \\ \hline \end{array}$

11. $\begin{array}{r} 3\frac{7}{18} \\ 2\frac{4}{12} \\ \hline \end{array}$

12. $\begin{array}{r} 9\frac{5}{16} \\ 10\frac{7}{24} \\ \hline \end{array}$

13. $\begin{array}{r} 1\frac{1}{2} \\ 2\frac{3}{9} \\ 5\frac{2}{18} \\ \hline \end{array}$

14. $\begin{array}{r} 6\frac{7}{12} \\ 2\frac{1}{3} \\ 3\frac{4}{9} \\ \hline \end{array}$

15. $\begin{array}{r} 4\frac{2}{15} \\ 8\frac{6}{20} \\ 7\frac{3}{9} \\ \hline \end{array}$

Worksheet II - Addition of Mixed Number, Continued

16.
$9\frac{5}{21}$
$6\frac{7}{36}$
$1\frac{8}{54}$

17.
$2\frac{1}{9}$
$3\frac{4}{10}$
$6\frac{2}{5}$

18.
$8\frac{1}{2}$
$7\frac{2}{3}$
$6\frac{5}{12}$

19.
$7\frac{3}{21}$
$1\frac{2}{4}$
$2\frac{5}{6}$

20.
$8\frac{3}{12}$
$7\frac{4}{25}$
$12\frac{9}{21}$

EQUIVALENT FRACTIONS

Worksheet III - Addition of Fractions

1. $$\begin{array}{r} 2\frac{7}{10} \\ \underline{3\frac{11}{16}} \end{array}$$

2. $$\begin{array}{r} 5\frac{5}{15} \\ \underline{7\frac{3}{10}} \end{array}$$

3. $$\begin{array}{r} 8\frac{1}{2} \\ \underline{2\frac{3}{4}} \end{array}$$

4. $$\begin{array}{r} 12\frac{2}{3} \\ \underline{2\frac{5}{6}} \end{array}$$

5. $$\begin{array}{r} 9\frac{9}{10} \\ \underline{10\frac{5}{8}} \end{array}$$

6. $$\begin{array}{r} 10\frac{2}{3} \\ \underline{11\frac{5}{8}} \end{array}$$

7. $$\begin{array}{r} 5\frac{1}{11} \\ \underline{6\frac{1}{8}} \end{array}$$

8. $$\begin{array}{r} 2\frac{1}{3} \\ \underline{3\frac{1}{4}} \end{array}$$

9. $$\begin{array}{r} 9\frac{1}{4} \\ \underline{8\frac{5}{12}} \end{array}$$

10. $$\begin{array}{r} 7\frac{1}{6} \\ \underline{5\frac{1}{2}} \end{array}$$

11. $$\begin{array}{r} 6\frac{1}{5} \\ \underline{7\frac{2}{7}} \end{array}$$

12. $$\begin{array}{r} 22\frac{6}{7} \\ \underline{13\frac{2}{3}} \end{array}$$

13. $$\begin{array}{r} 101\frac{1}{2} \\ \underline{10\frac{7}{10}} \end{array}$$

14. $$\begin{array}{r} 78\frac{2}{8} \\ \underline{64\frac{7}{10}} \end{array}$$

15. $$\begin{array}{r} 82\frac{5}{6} \\ \underline{91\frac{1}{8}} \end{array}$$

16. $$\begin{array}{r} 9\frac{2}{9} \\ \underline{4\frac{1}{4}} \end{array}$$

17. $$\begin{array}{r} 2\frac{1}{2} \\ 3\frac{2}{3} \\ \underline{5\frac{5}{6}} \end{array}$$

18. $$\begin{array}{r} 7\frac{1}{7} \\ 2\frac{1}{2} \\ \underline{1\frac{3}{10}} \end{array}$$

Worksheet III, Continued

19.

$$\begin{array}{r} 2\frac{1}{21} \\ 1\frac{2}{7} \\ 2\frac{5}{30} \\ \hline \end{array}$$

20.

$$\begin{array}{r} 6\frac{1}{10} \\ 2\frac{2}{5} \\ 3\frac{4}{15} \\ \hline \end{array}$$

Application Word Problems

1. A client uses 4 oz of shampoo. Since there are 32 oz. in a quart, we can say that 4/32 of a quart is used. Another equivalent fraction of this is

$$\frac{4}{32} = \frac{1}{x}$$

2. A rule measures the width of a board as 9/12 of a foot. If we wanted this measure in fourths, we would say

$$\frac{9}{12} = \frac{?}{4}$$

3. A mechanic fixes 10 cars in 3 days. Another mechanic fixes 18 cars in 5 days. Check the cross products to see if they are working at the same rate.

$$\frac{10 \text{ cars}}{3 \text{ days}} \overset{?}{=} \frac{18 \text{ cars}}{5 \text{ days}}$$

4. A dentist has 4 bottles of peroxide. If they each contain the following: 2½ oz., 1 1/5 oz., 2 2/7 oz., 3 1/3 oz., how much peroxide is their total?

5. A mason is mixing cement. Water is being added gradually. First 2½ gallons, then 1 2/3 gallons, finally 4/5 gallons. What is the total amount of water added?

6. An electrician is combining copper piping. If there are 4 lengths of pipe that measure 10 1/3 ft., 9 2/5 ft., 2 1/6 ft., and 10 3/10 ft., what is the total amount of pipe?

7. A boat has 2 gas tanks. One contains 42 1/3 gallons, the other 13 2/9 gallons. How much fuel is their total?

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I. PROGRAM TITLE - "Fraction Concentration"

II. PROGRAM DESCRIPTION
   A. Students will match equivalent fractions.
   B. Data lines are used throughout.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. See Peer Tutoring Reference Guide (Equivalent Fractions Number 8)
   B. Worksheets
      1. Solving Equivalent Fractions
      2. Addition of Fractions (unlike denominators)
      3. Addition of Fractions (level II)
   C. Additional Sources
      1. Mervin L. Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), p. 140.
      2. Edwin I. Stein, Refresher Mathematics (Boston: Allyn Bacon, Inc., 1980), pp. 88, 100-105, 146-147.

V. SKILLS NEEDED
   Finding equivalent fractions.

FRACTION CONCENTRATION

PLEASE CHANGE THESE DATA LINES IN PROGRAM # 10 TO
GET A NEW VERSION

```
1000 DATA EQUIVALENT FRACTIONS
1001 DATA 1/2, ,5/8, ,3/4, ,7/8,
1002 DATA 1/3, ,3/5, ,17/35, ,10/17,
1003 DATA 8/16, ,30/48, ,30/40, ,140/160,
1004 DATA 21/63, ,120/200, ,51/105, ,30/51,
```

```
1000 DATA IMPROPER FRACTIONS
1001 DATA 3  1/4, ,2  5/2, ,1  2/3, ,5  3/5,
1002 DATA 3  1/7, ,3  3/4, ,9  1/3, ,5  3/7,
1003 DATA 13/4, ,9/2, ,5/3, ,28/5,
1004 DATA 22/7, ,15/4, ,28/3, ,38/7,
```

```
1000 DATA MULTIPLICATION OF FRACTIONS
1001 DATA 3 1/4 X 6, ,6 X 4 5/8, ,3 5/6 X 9, ,2 3/8 X 2 1/4,
1002 DATA 2 3/5 X 1 1/6, ,2 5/9 X 3 1/2, ,3 1/4 X 1 1/8, ,2 2/7 X
3 1/3,
1003 DATA 19  1/2, ,27  3/4, ,34  1/2, ,5  11/32,
1004 DATA 3  1/30, ,8  17/18, ,3  21/32, ,7  13/21,
```

FRACTION CONCENTRATION

Worksheet #1 - Equivalent Fractions

Match Column A with Column B.

COLUMN A

1. ________ $\frac{2}{3}$
2. ________ $\frac{7}{8}$
3. ________ $\frac{1}{2}$
4. ________ $\frac{5}{9}$
5. ________ $\frac{9}{10}$
6. ________ $\frac{1}{5}$
7. ________ $\frac{1}{4}$
8. ________ $\frac{9}{12}$
9. ________ $\frac{18}{20}$
10. ________ $\frac{18}{30}$
11. ________ $\frac{15}{150}$
12. ________ $\frac{1000}{3000}$
13. ________ $\frac{10}{52}$
14. ________ $\frac{4}{5}$
15. ________ $\frac{1}{25}$
16. ________ $\frac{2}{9}$
17. ________ $\frac{1}{100}$
18. ________ $\frac{1}{25}$
19. ________ $\frac{5}{40}$
20. ________ $\frac{7}{49}$

COLUMN B

a. $\frac{4}{16}$
b. $\frac{1}{8}$
c. $\frac{27}{30}$
d. $\frac{1}{10}$
e. $\frac{100}{200}$
f. $\frac{6}{10}$
g. $\frac{1}{3}$
h. $\frac{3}{4}$
i. $\frac{12}{15}$
j. $\frac{10}{15}$
k. $\frac{4}{100}$
l. $\frac{30}{54}$
m. $\frac{1}{7}$
n. $\frac{36}{40}$
o. $\frac{10}{1000}$
p. $\frac{21}{24}$
q. $\frac{14}{63}$
r. $\frac{3}{75}$
s. $\frac{20}{100}$
t. $\frac{5}{26}$

FRACTION CONCENTRATION

Worksheet #2 - Addition of Fractions

$\begin{array}{r} 2\frac{1}{5} \\ \underline{3\frac{1}{3}} \end{array}$	$\begin{array}{r} 8\frac{1}{3} \\ \underline{5\frac{3}{7}} \end{array}$	$\begin{array}{r} 6\frac{4}{15} \\ \underline{8\frac{5}{20}} \end{array}$	$\begin{array}{r} 3\frac{7}{9} \\ \underline{2\frac{5}{12}} \end{array}$
$\begin{array}{r} 6\frac{6}{21} \\ \underline{5\frac{7}{24}} \end{array}$	$\begin{array}{r} 7\frac{1}{9} \\ \underline{2\frac{7}{10}} \end{array}$	$\begin{array}{r} 3\frac{5}{14} \\ \underline{4\frac{5}{21}} \end{array}$	$\begin{array}{r} 9\frac{2}{3} \\ \underline{8\frac{2}{9}} \end{array}$
$\begin{array}{r} 10\frac{11}{15} \\ \underline{11\frac{2}{18}} \end{array}$	$\begin{array}{r} 14\frac{8}{36} \\ \underline{18\frac{5}{30}} \end{array}$	$\begin{array}{r} 5\frac{1}{3} \\ \underline{3\frac{2}{5}} \end{array}$	$\begin{array}{r} 4\frac{6}{36} \\ \underline{2\frac{3}{21}} \end{array}$
$\begin{array}{r} 6\frac{5}{24} \\ \underline{8\frac{6}{36}} \end{array}$	$\begin{array}{r} 5\frac{3}{9} \\ \underline{9\frac{7}{6}} \end{array}$	$\begin{array}{r} 3\frac{19}{25} \\ \underline{9\frac{8}{15}} \end{array}$	$\begin{array}{r} 7\frac{1}{2} \\ \underline{6\frac{9}{10}} \end{array}$
$\begin{array}{r} 9\frac{7}{12} \\ \underline{3\frac{8}{18}} \end{array}$	$\begin{array}{r} 7\frac{9}{22} \\ \underline{5\frac{10}{33}} \end{array}$	$\begin{array}{r} 13\frac{8}{12} \\ \underline{7\frac{5}{15}} \end{array}$	$\begin{array}{r} 2\frac{11}{20} \\ \underline{8\frac{13}{30}} \end{array}$

FRACTION CONCENTRATION

Worksheet #3 - Addition of Fractions

$\frac{2}{3}$	$\frac{9}{10}$	$\frac{2}{5}$	$\frac{8}{9}$
$\frac{4}{5}$	$\frac{1}{3}$	$\frac{1}{7}$	$\frac{2}{7}$
$\underline{\frac{1}{2}}$	$\underline{\frac{7}{12}}$	$\underline{\frac{2}{15}}$	$\underline{\frac{5}{18}}$

$\frac{2}{5}$	$\frac{6}{7}$	$6\frac{9}{10}$	$5\frac{7}{8}$
$\frac{2}{3}$	$\frac{2}{9}$	$4\frac{3}{4}$	$2\frac{3}{4}$
$\underline{\frac{5}{12}}$	$\underline{\frac{4}{21}}$	$\underline{1\frac{2}{3}}$	$\underline{1\frac{2}{3}}$

$2\frac{1}{9}$	$22\frac{9}{10}$	$201\frac{7}{12}$
$1\frac{2}{11}$	$18\frac{1}{4}$	$403\frac{6}{18}$
$\underline{3\frac{1}{22}}$	$\underline{16\frac{3}{5}}$	$\underline{408\frac{9}{30}}$

I. PROGRAM TITLE - "Ruler II - Improper Fractions, Mixed Numbers, Multiplication & Division of Fractions"

II. PROGRAM DESCRIPTION
   A. Students will view a tutorial section that will show them how to change mixed numbers to improper fractions.
   B. Students will complete problems where they will change mixed numbers to improper fractions.
   C. Students will view a tutorial section on changing improper fractions to mixed numbers.
   D. Students will complete problems where they change improper fractions to mixed numbers.
   E. Students will view a tutorial section that explains multiplication of fractions.
   F. Students will complete multiplication of fractions problems.
   G. Students will view a tutorial section that explains division of fractions.
   H. Students will complete division of fractions problems.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide
   B. Worksheets (four covering each topic: mixed numbers to improper fractions, improper fractions to mixed numbers, multiplication of fractions, division of fractions).
   C. Application Problems
   D. Additional Sources
      1. Edwin I. Stein, *Refresher Mathematics* (Boston: Allyn and Bacon, 1980), pp. 100-111.
      2. Keedy et al., *General Mathematics* (Menlo Park, California: Addison Wesley, 1980), pp. 170-188.

V. SKILLS NEEDED
All operations related to whole numbers. Addition, subtraction equivalent fractions.

```
1 '*** RULER-IMPROPER FRACTIONS-MIXED NUMBERS      *******
2 '*** MULTIPLICATION & DIVISION OF FRACTIONS       *******
3 '*** WRITTEN BY J.DALY,M.MCALISTER,M.MCNEARNEY   *******
4 '*** FOR COMP ASS'T VOC MATH - OCT 1980           *******
5 CLS:CLEAR 100:Z=0
6 PRINT @512," ";:INPUT "GOOD MORNING, WHAT IS YOUR NAME";A$:CLS
7 DIMA$(20):DIMA(20):DIMB$(20):DIMBW(20):DIMBN(20):DIMBD(20)
8 FOR K=1TO10
10 READ A$(K), A(K)
13 NEXT
20 DATA "3  1/4 = ?/4",13,"2  5/2 = ?/2",9,"1  2/3 = ?/3",5,"5  3/
5 = ?/5",28,"3  1/7 = ?/7",22,"3  3/4 = ?/4",15,"9  1/3 = ?/3",28,
"5  3/7 = ?/7",38," 7  1/2 = ?/2",15,"4  2/5 = ?/5",22
21 DATA "23/5 =",4,3,5,"9/5 =",1,4,5,"11/6 =",1,5,6,"13/8 =",1,5,8
,"20/9=",2,2,9,"13/2=",6,1,2,"19/3 =",6,1,3,"45/7 =",6,3,7,"25/3 =
",8,1,3,"19/3 =",6,1,3
22 DATA "3  1/4 X 6 =",19,1,2,"6 X 4  5/8 =",27,3,4,"3  5/6 X 9 ="
,34,1,2,"2  3/8 X 2  1/4 =",5,11,32,"2  3/5 X 1 1/6 =",3,1,30,"2
5/9 X 3  1/2 =",8,17,18,"1  2/7 X 3  2/5 =",4,13,35,"2  2/7 X 3  1
/3 =",7,13,21,"2  3/4 X 4  1/2 =",12,3,8
23 DATA "3  1/4 X 1  1/8 =",3,21,32
24 DATA "8/15 DIVIDED BY 6 =",0,4,45,"4 DIVIDED BY 3/5 =",6,2,3,"3
 DIVIDED BY 5/6 =",3,3,5,"3/4 DIVIDED BY 3/10 =",2,1,2,"5/6 DIVIDE
D BY 3/8 =",2,2,9,"5/6 DIVIDED BY 3/10 =",2,7,9
25 DATA "4  1/5 DIVIDED BY 2  1/3 =",1,4,5,"6  3/4 DIVIDED BY 3  3
/5 =",1,7,8,"3  1/8 DIVIDED BY 1  3/7 =",2,3,16,"4  6/7 DIVIDED BY
 1  8/9 =",2,4,7
100 FOR X=13TO114:SET(X,12):SET(X,20):NEXT
110 SET(13,13):SET(114,13):SET(13,14):SET(114,14):SET(63,15):SET(1
14,15):SET(13,15)
120 SET (13,16):SET(38,16):SET(63,16):SET(89,16):SET(114,16)
130 SET(13,17):SET(20,17):SET(26,17):SET(32,17):SET(38,17):SET(44,
17):SET(50,17):SET(56,17):SET(63,17):SET(71,17):SET(77,17):SET(83,
17):SET(89,17):SET(95,17):SET(101,17):SET(107,17):SET(114,17)
140 SET(13,18):SET(38,18):SET(63,18):SET(89,18):SET(114,18):SET(13
,19):SET(114,19)
150 SET(14,23):SET(15,23):SET(111,23):SET(112,23):SET(113,23):SET(
114,23)
160 FOR Y = 25 TO 27:SET(14,Y):SET(15,Y):SET(111,Y):NEXT
170 FOR X = 112 TO 114:SET(X,25):SET(X,27)
180 SET(14,24):SET(15,24):SET(114,24)
190 SET(114,25):SET(114,27):SET(113,25):SET(113,27)
191 PRINT @710 ,"THE INCHES ON A RULER ARE DIVIDED INTO 16 EQUAL P
ARTS"
192 FOR Q=1 TO 40
193   RESET(20,17):RESET(26,17):RESET(32,17):RESET(38,17):RESET(44
,17):RESET(50,17):RESET(56,17):RESET(63,17):RESET(71,17):RESET(77,
17):RESET(83,17):RESET(89,17):RESET(95,17):RESET(101,17):RESET(107
,17)
194 SET(20,17):SET(26,17):SET(32,17):SET(38,17):SET(44,17):SET(50,
17):SET(56,17):SET(63,17):SET(71,17):SET(77,17):SET(83,17):SET(89,
17):SET(95,17):SET(101,17):SET(107,17)
```

```
195 NEXT
197 PRINT @671, CHR$(91)
198 PRINT @775,"AS WE CAN SEE, 1/2 INCH IS EQUIVALENT TO 8/16 INCH
":FOR X=1 TO 2000:NEXT
199 PRINT @659,CHR$(91):PRINT @671, CHR$(91):PRINT @684,CHR$(91)
200 PRINT @775, "ALSO, 4/16 INCH = 1/4 INCH, AND 12/16 INCH =3/4 I
NCH"
201 FOR X=1 TO 4000:NEXT
202 PRINT @ 775, " WE CAN CLEARLY SEE, IF WE ARE GOING TO USE A RU
LER,"
203 PRINT @ 838,"WE MUST BE ABLE TO EXPRESS FRACTIONS IN EQUIVALEN
T WAYS.
204 FOR X=1TO 4000:NEXT
205 PRINT @ 772,"    WE MUST ALSO KNOW HOW TO ADD, MULTIPLY,DIVIDE
,      "
206 PRINT @838,"                    AND SUBTRACT FRACTIONS.
"
207 FOR X=1 TO 4000:NEXT
208 CLS
209 PRINT@448,"THIS LESSON WILL REVIEW MIXED NUMBERS, IMPROPER FRA
CTIONS,"
210 PRINT@522, "MULTIPLICATION AND DIVISIONS OF FRACTIONS"
211 PRINT @ 640, "REMEMBER----- ALL YOUR ANSWERS MUST BE IN SIMPLE
ST FORM!!!!!!"
212 PRINT @704, STRING$(64,CHR$(91))
215 GOSUB 3000
216 CLS
1000 PRINT@132,"PLEASE EXPRESS THE FOLLOWING AS IMPROPER FRACTIONS
"
1005 PRINT@275, "3  1/4  =  ?/4"
1010 FOR N=1TO 500:NEXT
1012 PRINT@462, "tHE PROCEDURE IS SIMPLE!"
1014 FOR N=1TO1000:NEXT
1016 PRINT@655," 3 = 12/4      +       1/4    = "
1018 PRINT@798, "13/4"
1020 FORN=1TO1000:NEXT
1022 GOSUB3000
1023 CLS
1024 PRINT@72, "THE SIMPLEST WAY TO DO THESE PROBLEMS IS TO"
1026 PRINT@333,"1. MULTIPLY THE WHOLE NUMBER BY THE DENOMINATOR"
1028 FOR N=1TO1000:NEXTN
1030 PRINT@461,"2. ADD THE NUMERATOR TO THIS PRODUCT"
1032 FOR N=1TO1000:NEXTN:PRINT@589,"3. THIS IS THE NEW NUMERATOR"
1034 FOR N=1TO1000:NEXTN:PRINT@717,"4. kEEP THE OLD DENOMINATOR"
1035 GOSUB3000
1036 CLS:PRINT@205,"EX 1.    5  2/3  =  ?/3"
1038 PRINT@397, "THINK----5 TIMES 3  PLUS  2  =  17"
1040 FORN=1TO1000:NEXTN:PRINT@589," THE ANSWER IS  17/3"
1042 FOR N=1TO1000:NEXTN:PRINT@707, "NOW, "A$" ,GET READY FOR THE
QUIZ!!!!"
1044 GOSUB3000
1219 CLS
1220 FOR N=1 TO 10:PRINT@115,"PROB. ";N:PRINT@340, A$(N) :PRINT@46
4,"YOUR ANSWER ";:INPUT A
```

```
1230 GOSUB4000
1240 GOSUB3000
1245 CLS
1250 NEXT
1260 PRINT@460, "YOUR SCORE IS " INT((T/10)*100)"%":PRINT@524,"BE
SURE TO HAVE YOUR SCORE RECORDED BEFORE GOING ON"
1265 T = 0
1270 GOSUB3000
1280 CLS:PRINT@464, "********   PART 2  ********"
1290 GOSUB3000
1295 CLS
1300 PRINT@205, "IN THIS SECTION, "A$ ", WE WILL"
1302 PRINT@465, "CHANGE IMPROPER FRACTIONS TO MIXED NUMBERS"
1304 PRINT@529, "MULTIPLY FRACTIONS"
1306 PRINT@593, "DIVIDE FRACTIONS"
1308 FOR N=1TO1000:NEXT
1310 PRINT@845, "LET'S SEE ABOUT THE IMPROPER TO MIXED PROBLEMS"
1312 FOR N=1TO1000:NEXT:GOSUB 3000
1313 CLS
1314 PRINT@77, "CHANGE  9/2  TO A MIXED NUMBER"
1316 FORN=1TO1000:NEXT:PRINT@207,"DIVIDE THE 9  BY THE 2"
1318 FOR N=1TO1000:NEXT:PRINT@328, "THE RESULT WILL BE 4 WITH REMA
INDER 1."
1320 FOR N=1TO1000:NEXT:PRINT@456,"EXPRESS THE REMAINDER AS A FRAC
TION, 1/2."
1322 FOR N=1TO1000:NEXT:PRINT@584,"THE ANSWER IS 4  1/2"
1330 FORN=1TO1500:NEXT:GOSUB 3000
1465 CLS
1475 PRINT@960," ";:INPUT "DO YOU WISH TO SEE THIS EXAMPLE AGAIN";
D$
1480 IF D$="YES"THEN 1280
1490 CLS:PRINT@128,"THIS IS A QUIZ ON  CHANGING IMPROPER FRACTIONS
 TO MIXED NUMBERS"
1500 FOR N=1TO1500:NEXT
1510 PRINT@390, "THE ANSWERS HAVE TO BE TYPED IN THE FOLLOWING MAN
NER."
1520 PRINT@538, "WHOLE NUMBER ?"
1530 PRINT@666, "NUMERATOR ?"
1540 PRINT@794, "DENOMINATOR ?"
1550 GOSUB 3000
1560 CLS
1561 Q=0
1570 FOR N=1TO10:READ B$(N),BW(N),BN(N),BD(N):PRINT@115, "PROB. ";
N:PRINT@340, B$(N)
1580 PRINT@ 468, " ";:INPUT "WHOLE NUMBER";BW
1590 PRINT@596, " ";:INPUT "NUMERATOR";BN
1600 PRINT@724, " ";:INPUT "DENOMINATOR";BD
1610 GOSUB 5000
1620 GOSUB 3000
1630 CLS
1640 NEXT
1650 PRINT @ 460, "YOUR SCORE IS " INT((Q/10)*100)"%": PRINT @ 524
, "BE SURE TO HAVE YOUR TEACHER RECORD YOUR GRADE."
```

```
1655 Q=0
1660 GOSUB 3000
1665 CLS
1666 IF Z=2 GOTO 1800
1667 IF Z=3 CLS:PRINT@464, "GOOD BYE, "A$", HAVE A NICE DAY!":END
1699 CLS:PRINT@464, "**********  PART 3  *********":FOR N=1TO1000:
NEXT
1700 PRINT @ 455, "THIS SECTION WILL BE ON MULTIPLICATION OF FRACT
IONS"
1705 T=0
1710 FOR N=1 TO 2000:NEXT:CLS
1720 PRINT @ 128, "LET'S LOOK AT AN EXAMPLE.":FOR Y = 1 TO 1000:NE
XT
1730 PRINT @ 402, "5  2/3 X 4 3/4 =":FOR Y = 1 TO 1000: NEXT
1740 PRINT @520, "CHANGE EACH NUMBER TO AN IMPROPER FRACTION":FOR
Y = 1 TO 1000: NEXT
1750 PRINT @ 658, " 17/3  X  19/4 ":FOR Y = 1 TO 1000:NEXT
1760 PRINT @ 776, "MULTIPLY THE NUMERATORS AND THE DENOMINATORS":F
OR Y = 1 TO 1000:NEXT
1780 PRINT @ 896, "THE RESULT IS 323/12 . NOW CHANGE TO THE MIXED
NUMBER 26  11/12":FOR Y = 1 TO 1000:NEXT
1788 GOSUB 3000
1789 CLS
1790 Z=2:GOTO 1570
1800 CLS: PRINT @464, "*******  PART 4  *******"
1810 GOSUB3000
1820 CLS
1830 PRINT@79,"OK, "A$" ,LET'S LOOK AT DIVISION OF FRACTIONS."
1840 FOR N=1TO1000:NEXTN:PRINT@200, "DIVISION IS MUTIPLICATION BY
THE INVERSE."
1850 FOR N=1TO 1500:NEXT:PRINT@328,"WAIT A MINUTE---WHAT IS AN INV
ERSE?"
1860 FOR N=1TO1000:NEXTN:PRINT@455,"AN INVERSE IS THE DIVISOR TURN
ED UPSIDE DOWN!!"
1870 FOR N=1TO1500: NEXTN:PRINT@583, "ONCE YOU CHANGE TO THE DIVIS
OR'S INVERSE, YOU MULTIPLY."
1880 FOR N=1TO1500:NEXT:PRINT@711,"EASY----LET'S SEE A PROBLEM DON
E FOR US."
1890 GOSUB3000
1900 CLS
1910 PRINT@75, "  1  1/2  DIVIDED BY  2  1/6  "
1920 FOR N=1TO1000:NEXTN:PRINT@192,"FIRST, CHANGE THE MIXED NUMBER
S TO IMPROPER FRACTIONS."
1930 FOR N=1TO 1000:NEXTN:PRINT@329,"   3 / 2  DIVIDED BY  13 / 6
 "
1940 FOR N=1TO1000:NEXT:PRINT@448, "NOW, CHANGE DIVISION TO MULTIP
LICATION BY INVERTING THE DIVISOR."
1950 FOR N=1TO 1000:NEXT:PRINT@585, "   3 /2   TIMES   6/13  "
1960 FOR N=1TO1000:NEXT:PRINT@704,"NOW MULTIPLY-----YOU GET 18 /26
."
1970 FOR N=1TO1000:NEXT:PRINT@841, "THE SIMPLEST ANSWER IS 9 /13."
```

```
1980 GOSUB3000
1985 CLS:PRINT@450, " HERE COMES THE TEST ON DIVISION!!!"
1986 FOR N=1TO1500:NEXT
1990 CLS:Z=3:GOTO1500
3000 PRINT @ 960,"PRESS C TO CONTINUE."
3001 I$=INKEY$:IFI$="C" THEN RETURN ELSE 3001
4000 IF A=A(N) PRINT @832,"CORRECT":T=T+1:RETURN:ELSE PRINT @832,
"SORRY, THAT IS NOT CORRECT, "A$ ", THE CORRECT ANSWER IS, "A(N):R
ETURN
5000 IF BW=BW(N) AND BN=BN(N) AND BD=BD(N) PRINT @832,"CORRECT":Q=
Q+1:RETURN:ELSE PRINT @832,"SORRY, THAT IS NOT CORRECT, "A$ ", THE
 CORRECT ANSWER IS "BW(N)" "BN(N)"/"BD(N):RETURN
```

MIXED NUMBERS, IMPROPER FRACTIONS
MULTIPLICATION AND DIVISION OF FRACTIONS

Peer Tutoring Reference Guide

EXAMPLE I

Express as an Improper Fraction:

$$3\frac{1}{4} = \underline{\quad ? \quad}$$

$$3 = \frac{12}{4} + \frac{1}{4} = \frac{13}{4}$$

The simplest way to do these problems is to:

1. multiply the whole number by the denominator
2. add the numerator to this product
3. this is the new numerator
4. keep the old denominator

$$5\frac{2}{3} = \underline{\quad ? \quad}$$

REMEMBER the steps:

1. multiply the denominator by the whole number (that's 15)
2. add the numerator to that (15 + 2)
3. 17 is the new numerator
4. Answer: $\frac{17}{3}$

Changing Improper Fractions to Mixed Numbers

EXAMPLE II

$$\frac{18}{5} = \underline{\quad ? \quad}$$

Here the procedure is simple: all we need to do is divide the numerator (18) by the denominator (5), resulting in an answer of 3 with a remainder of 3 or

$$3\frac{3}{5}$$

Peer Tutoring Reference Guide

Multiplication of Mixed Numbers

EXAMPLE III

$$5\frac{3}{4} \quad \times \quad 2\frac{2}{3} \quad =$$

Again, by following a few simple instruction, you will have no problems.

1. change the mixed numbers to improper fractions
2. cross cancel (if possible), then multiply the numerators for a resultant numerator
3. now multiply the denominators for a resultant denominator
4. divide if necessary

Let's take the problem through these steps:

$5\frac{3}{4} \times 2\frac{2}{3}$

1. change the mixed numbers to improper fractions

$$\frac{23}{4} \times \frac{8}{3}$$

2. cross cancel if possible, then multiply numerators

$$\frac{23}{\cancel{4}} \times \frac{\cancel{8}^{2}}{3} = \frac{46}{3}$$

3. divide

$$\begin{array}{r} 15\,\frac{1}{3} \\ 3\overline{)46} \\ \underline{3} \\ 16 \\ \underline{15} \\ 1 \end{array}$$

ANSWER: $15\frac{1}{3}$

Peer Tutoring Reference Guide

EXAMPLE IV

$$1\frac{1}{2} \div 2\frac{1}{6}$$

1. change the mixed numbers to improper fractions

$$\frac{3}{2} \div \frac{13}{6}$$

2. change division to multiplication by inverting the divisor

$$\frac{3}{2} \times \frac{6}{13}$$

3. multiply

$$\frac{3}{\cancel{2}} \times \frac{\cancel{6}^{3}}{13}$$

ANSWER is: $\frac{9}{13}$

MIXED NUMBERS, IMPROPER FRACTIONS
MULTIPLICATION AND DIVISION OF FRACTIONS

Worksheet I Changing mixed numbers to improper fractions

1. $2\frac{1}{8} = \frac{\quad}{8}$

2. $7\frac{1}{3} = \frac{\quad}{3}$

3. $5\frac{2}{5} = \frac{\quad}{5}$

4. $3\frac{4}{9} = \frac{\quad}{9}$

5. $12\frac{1}{2} = \frac{\quad}{2}$

6. $9\frac{1}{4} = \frac{\quad}{4}$

7. $10\frac{2}{3} = \frac{\quad}{3}$

8. $3\frac{7}{8} = \frac{\quad}{8}$

9. $4\frac{9}{10} = \frac{\quad}{10}$

10. $5\frac{1}{12} = \frac{\quad}{12}$

11. $6\frac{1}{3} = \frac{\quad}{3}$

12. $2\frac{2}{5} = \frac{\quad}{5}$

13. $7\frac{5}{6} = \frac{\quad}{6}$

14. $11\frac{1}{2} = \frac{\quad}{2}$

15. $4\frac{2}{7} = \frac{\quad}{7}$

16. $6\frac{1}{4} = \frac{\quad}{4}$

17. $3\frac{2}{3} = \frac{\quad}{3}$

18. $7\frac{7}{8} = \frac{\quad}{8}$

19. $8\frac{6}{10} = \frac{\quad}{10}$

20. $9\frac{3}{4} = \frac{\quad}{4}$

MIXED NUMBERS, IMPROPER FRACTIONS
MULTIPLICATION AND DIVISION OF FRACTIONS

Worksheet II Cahnging improper fractions to mixed numbers

1. $\frac{27}{5}$ = __________

2. $\frac{9}{2}$ = __________

3. $\frac{16}{3}$ = __________

4. $\frac{28}{6}$ = __________

5. $\frac{19}{4}$ = __________

6. $\frac{28}{16}$ = __________

7. $\frac{13}{2}$ = __________

8. $\frac{52}{3}$ = __________

9. $\frac{9}{5}$ = __________

10. $\frac{19}{7}$ = __________

11. $\frac{15}{7}$ = __________

12. $\frac{16}{6}$ = __________

13. $\frac{22}{7}$ = __________

14. $\frac{31}{6}$ = __________

15. $\frac{51}{4}$ = __________

16. $\frac{14}{5}$ = __________

17. $\frac{17}{4}$ = __________

18. $\frac{41}{2}$ = __________

19. $\frac{32}{3}$ = __________

20. $\frac{41}{5}$ = __________

21. $\frac{29}{4}$ = __________

22. $\frac{84}{9}$ = __________

23. $\frac{101}{10}$ = __________

24. $\frac{45}{11}$ = __________

25. $\frac{65}{16}$ = __________

MIXED NUMBERS, IMPROPER FRACTIONS
MULTIPLICATION AND DIVISION OF FRACTIONS

Worksheet III Multiplication of fractions

1. $2\frac{1}{3} \times 4\frac{1}{2} =$ ________

2. $7\frac{2}{9} \times 2\frac{1}{3} =$ ________

3. $6\frac{1}{4} \times 3\frac{2}{3} =$ ________

4. $5\frac{2}{3} \times 4\frac{3}{4} =$ ________

5. $9\frac{1}{2} \times 3\frac{1}{3} =$ ________

6. $4\frac{1}{4} \times 2\frac{1}{10} =$ ________

7. $7\frac{1}{2} \times 2\frac{1}{3} =$ ________

8. $8\frac{3}{4} \times 5\frac{1}{3} =$ ________

9. $10\frac{1}{2} \times 2\frac{1}{3} =$ ________

10. $4\frac{1}{3} \times 5\frac{1}{2} =$ ________

11. $7\frac{1}{5} \times 5\frac{1}{7} =$ ________

12. $6 \times 2\frac{1}{3} =$ ________

13. $4\frac{1}{4} \times 3\frac{1}{12} =$ ________

14. $5\frac{4}{9} \times 2\frac{1}{3} =$ ________

15. $2\frac{2}{3} \times 5\frac{1}{3} =$ ________

16. $5\frac{1}{6} \times 4\frac{2}{3} =$ ________

17. $4\frac{2}{3} \times 7\frac{2}{3} =$ ________

18. $9\frac{1}{2} \times 8\frac{2}{3} =$ ________

19. $5\frac{1}{2} \times 6\frac{1}{2} =$ ________

20. $9\frac{2}{3} \times 10\frac{1}{2} =$ ________

MIXED NUMBERS, IMPROPER FRACTIONS
MULTIPLICATION AND DIVISION OF FRACTIONS

Worksheet IV Division of fractions

1. $\frac{8}{15} \div 6 =$ __________

2. $4\frac{1}{2} \div 3\frac{1}{3} =$ __________

3. $6\frac{1}{4} \div 2\frac{2}{3} =$ __________

4. $4\frac{2}{5} \div 4\frac{3}{4} =$ __________

5. $9\frac{1}{3} \div 2\frac{1}{4} =$ __________

6. $5\frac{1}{4} \div 2\frac{1}{4} =$ __________

7. $7\frac{1}{2} \div 3\frac{1}{9} =$ __________

8. $10\frac{1}{2} \div 4\frac{1}{3} =$ __________

9. $4\frac{1}{2} \div 1\frac{1}{3} =$ __________

10. $6\frac{1}{2} \div 6 =$ __________

11. $5\frac{1}{3} \div 3 =$ __________

12. $\frac{3}{4} \div \frac{3}{10} =$ __________

13. $4\frac{1}{5} \div 2\frac{1}{3} =$ __________

14. $7 \div 2\frac{1}{6} =$ __________

15. $\frac{2}{3} \div 8 =$ __________

16. $\frac{5}{6} \div \frac{3}{8} =$ __________

17. $6\frac{3}{4} \div 3\frac{3}{5} =$ __________

18. $4\frac{6}{7} \div 1\frac{8}{9} =$ __________

19. $3\frac{1}{8} \div 1\frac{3}{7} =$ __________

20. $\frac{5}{6} \div \frac{3}{10} =$ __________

MIXED NUMBERS, IMPROPER FRACTIONS
MULTIPLICATION AND DIVISION OF FRACTIONS

Application Problems

1. A carpenter uses $5\frac{1}{3}$ boxes of nails on one project. If 6 projects of similar size are to be completed, how many boxes of nails are needed?

2. If a beautician uses an average of 2½ dozen perm rods per customer, how many dozen rods will be needed to give 9 customers perms simultaneously?

3. If a dentist uses 1½ grams of gold in a filling, how many grams would be needed for 4 teeth?

4. If each lab tech smock requires 2½ yards of material, how many smocks can be made from 30 years of material?

5. A bus travels 87½ miles in 2¼ hours. What is the average speed?

6. A 15½ ft. wire is cut into 5 equal lengths. What is the length of each piece?

7. How many business cards measuring 1¼" wide can be cut from stock 25" wide?

I. PROGRAM TITLE - "Ruler II - Concentration"
(Mixed Numbers, Improper Fractions, Multiplication and Division of Fractions)

II. PROGRAM DESCRIPTION
- A. Students will match improper fractions with their proper mixed number equivalents.
- B. Students will multiply fractions and match them with the correct response.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
- A. See Peer Tutoring Reference Guide for Ruler II
- B. Worksheets
  - 1. Related Problems Improper Fractions
  - 2. Related Problems Multiplication
  - 3. Special Sample Sheet Division
- C. Additional Sources
  - 1. Edwin I. Stein, Refresher Mathematics (Boston: Allyn and Bacon, 1980), pp. 100-111.
  - 2. Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), pp. 170-188.

V. SKILLS NEEDED
All operations related to whole numbers. Addition, subtraction equivalent fractions.

```
5 '***** CONCENTRATION *****
10 ' * BY ISABELLA WIGGINS, SOMERSET, NJ, 1979 *
15 ' *** DATA STARTS IN LINE 1000 ***
20 '
25 DEFINT I-N: CLEAR (512): RANDOM: DIM W$(32),IR(16),KR(2),KS(2)
30 NS=1
35 CLS
40 '*** INSTRUCTIONS ***
45 GOSUB 200
50 '*** RANDOMIZE AND INITIALIZE ***
55 GOSUB 300
60 '*** DRAW BOARD ***
65 GOSUB 400
70 '*** INPUT SQUARE CHOICE ***
75 GOSUB 500
80 '*** DISPLAY SQUARE ***
85 GOSUB 600
90 IF JS=2 THEN 70
95 '*** MATCH AND SCORE ***
100 GOSUB 700
105 IF NG<>0 AND JL+JR<>8 THEN 70
110 '*** END ***
115 GOSUB 900
120 END
200 '*** INSTRUCTIONS ***
205 FOR IY=3 TO 9
210 SET (4,IY):SET(13,IY):SET(19,IY):SET(22,IY):SET(28,IY):SET(31,
IY):SET(40,IY):SET(49,IY):SET(55,IY):SET(61,IY):SET(67,IY):SET(76,
IY):SET(82,IY):SET(88,IY):SET(97,IY):SET(103,IY):SET(109,IY):SET(1
12,IY):SET(118,IY):SET(123,IY)
215 NEXT IY
220 FOR IX=1 TO 6:SET(IX+3,3):SET(IX+3,9):SET(IX+12,3):SET(IX+12,9
):SET(IX+22,IX+3):SET(IX+30,3):SET(IX+30,9):SET(IX+39,3):SET(IX+39
,6):SET(IX+39,9):SET(IX+49,IX+3):SET(IX+58,3):SET(IX+67,3):SET(IX+
67,6):SET(IX+75,3):SET(IX+75,6)
225 SET(IX+84,3):SET(IX+93,3):SET(IX+93,9):SET(IX+102,3):SET(IX+10
2,9):SET(IX+112,IX+3)
230 NEXT IX
235 SET(73,4):SET(73,5):SET(73,9):SET(72,8):SET(71,7):RESET(123,7)
:RESET(123,8)
240 PRINT @ 384, "A GAME OF SKILL AND MEMORY"
245 PRINT @ 512, "TRY TO MATCH THE WORDS HIDDEN BEHIND THE SQUARES
."
250 PRINT "ENTER YOUR CHOICE OF SQUARE WHEN "
255 PRINT "'WHAT SQUARE' APPEARS BELOW YOUR NAME."
260 PRINT: PRINT "IF YOU WANT THE BOARD REDRAWN, ENTER A NEGATIVE
NUMBER."
265 PRINT:INPUT "PRESS 'ENTER' TO CONTINUE";X
270 CLS
275 RETURN
300 ' *** RANDOMIZE AND INITIALIZE ***
305 IF NS=1 THEN 315
310 FOR I=1 TO (33*(NS-1)):READ A$: NEXT
315 READ T$: FOR I=1 TO 16: READ W$(I),W$(I+16): NEXT I
```

```
320 PRINT @ 384,"TODAY'S TOPIC IS ";T$
325 IR(1)=RND(16): K=2
330 IR(K)=RND(16)
335 FOR I=1 TO K-1: IF IR(I)=IR(K) THEN 330
337 NEXT I
340 K=K+1: IF K<17 THEN 330
345 PRINT @ 650,"1 OR 2 PLAYERS";
350 INPUT NP: IF NP<>1 AND NP<>2 THEN 345
355 JL=0:JR=0:NT=1:JS=1:NG=15
360 IF NP=2 THEN 370
365 PRINT @ 778,"NAME OF PLAYER";:INPUT P1$:GOTO 380
370 PRINT @ 778, "NAME OF FIRST PLAYER";: INPUT P1$
375 PRINT @ 842, "NAME OF SECOND PLAYER";: INPUT P2$
380 FOR I=1 TO 1000:NEXT:CLS
385 RETURN
400 '*** DRAW BOARD ***
405 CLS
410 FOR IY=1 TO 37 STEP 9
415 FOR IX=2 TO 124
420 SET(IX,IY)
425 NEXT IX,IY
430 FOR IX=3 TO 123 STEP 30
435 FOR IY=2 TO 36
440 SET(IX,IY)
445 NEXT IY,IX
450 FOR N=1 TO 16
455 IF IR(N)>0 THEN PRINT @ (132*INT((N-1)/4)+15*N+56),N;
460 NEXT N
465 PRINT @ 832,P1$;"'S SCORE =";
470 PRINT @ 857,JL;
475 IF NP=2 THEN 490
480 PRINT @ 864,"TURNS TO GO";:PRINT @ 889,NG
485 GOTO 495
490 PRINT @ 864,P2$;"'S SCORE =";:PRINT @ 889,JR;
495 RETURN
500 '*** INPUT CHOICE ***
505 KP=896:IF NP+NT=4 THEN KP=928
510 PRINT @ KP, "                               ";
515 PRINT @ KP,"WHAT SQUARE";:INPUT K
520 IF K<0 THEN 540
525 IF K<1 OR K>16 THEN 510
530 IF IR(K)=0 THEN 510
535 GOTO 565
540 GOSUB 400
542 GOTO 515
545 IF NT=1 THEN GOTO 500
550 PRINT @ (132*LH+15*KS(JS)+52),W$(KR(JS));
555 PRINT @ (132*LH+15*KS(JS)+116),W$(KR(JS)+16)
560 GOTO 500
565 RETURN
600 '*** DISPLAY ***
605 KS(JS)=K:KR(JS)=IR(K):IR(K)=0
```

```
610 LH=INT((K-1)/4)
615 FOR I=1 TO 2
620 FOR IX=30*(K-LH*4)-26 TO 30*(K-LH*4)+2 STEP 2
625 FOR IY=9*LH+2 TO 9*LH+9 STEP 2
630 IF I=1 SET(IX,IY) ELSE RESET(IX,IY)
635 NEXT IY,IX,I
640 PRINT @ (132*LH+15*K+52),W$(KR(JS));
645 PRINT @ (132*LH+15*K+116),W$(KR(JS)+16);
650 PRINT @ 960," ";
655 IF JS=1 THEN JS=2 ELSE JS=1
660 IF JS=1 AND NT= 1 THEN NT=2 ELSE 665
662 GOTO 670
665 IF JS=1 AND NT=2 THEN NT=1
670 RETURN
700 '*** MATCH AND SCORE ***
705 IF ABS(KR(1)-KR(2))=8 THEN LS=1 ELSE LS=0
710 FOR IX=0 TO 64 STEP 2: SET(IX,43):SET(127-IX,43):NEXT IX
715 FOR IX=64 TO 58 STEP -2:RESET(IX,43):RESET(127-IX,43):NEXT IX
720 IF LS=0 THEN PRINT @ 925,"WRONG!";ELSE PRINT @ 925, "RIGHT!";
725 FOR IX=56 TO 0 STEP -2:RESET(IX,43):RESET(127-IX,43):NEXT IX
730 FOR I=1 TO 2
735 K=KS(I):LH=INT((K-1)/4)
740 FOR IX=30*(K-LH*4)-26 TO 30*(K-LH*4)+2 STEP 2
745 FOR IY=9*LH+3 TO 9*LH+9 STEP 2
750 RESET(IX,IY)
755 NEXT IY,IX
760 IF LS=0 THEN PRINT @(132*LH+15*K+56),K;:PRINT @ 957," ";
765 NEXT I
770 IF NP=1 THEN 795
775 IF LS=1 THEN 785
780 IR(KS(1))=KR(1):IR(KS(2))=KR(2):GOTO 790
785 IF NT=1 THEN JR=JR+1 ELSE JL=JL+1
790 PRINT @ 857,JL;:PRINT @ 889, JR;:GOTO 805
795 NG=NG-1:IF LS=1 THEN JL=JL+1
800 PRINT @ 857,JL;:PRINT @ 889,NG;
805 FOR IX=0 TO 127::RESET(IX,43)::NEXT IX
807 IF LS=1 THEN 810
808 IR(KS(1))=KR(1): IR(KS(2))=KR(2)
810 RETURN
900 CLS
905 IF NP=2 THEN 920
910 PRINT @ 448,"FINAL SCORE IS ";;JL;"OUT OF 8 IN";15-NG;"TRIES."
;
915 GOTO 940
920 PRINT @ 466,"FINAL SCORE"
925 PRINT @ 515,P1$;" ";JL
930 PRINT @ 579,P2$;" ";JR
940 PRINT:PRINT
945 RETURN
1000 DATA EQUIVALENT FRACTIONS
1001 DATA 1/2, ,5/8, ,3/4, ,7/8,
1002 DATA 1/3, ,3/5, ,17/35, ,81/85,
1003 DATA 2/4, ,15/24, ,15/20, ,35/40,
1004 DATA 8/24, ,6/10, ,34/70, ,162/170,
```

RULER II - CONCENTRATION

Worksheet I Improper Fractions - Mixed Numbers

Match Column A with Column B

COLUMN A

_______ 1. $\frac{17}{3}$

_______ 2. $2\frac{1}{2}$

_______ 3. $2\frac{4}{7}$

_______ 4. $3\frac{2}{3}$

_______ 5. $7\frac{4}{5}$

_______ 6. $\frac{21}{4}$

_______ 7. $8\frac{1}{16}$

_______ 8. $\frac{51}{3}$

_______ 9. $\frac{27}{5}$

_______ 10. $12\frac{1}{3}$

_______ 11. $\frac{124}{11}$

_______ 12. $\frac{125}{10}$

_______ 13. $20\frac{1}{3}$

_______ 14. $15\frac{2}{5}$

_______ 15. $4\frac{3}{4}$

COLUMN B

a. $\frac{11}{3}$

b. $\frac{129}{16}$

c. 17

d. $5\frac{2}{7}$

e. $\frac{37}{3}$

f. $\frac{39}{5}$

g. $11\frac{3}{11}$

h. $\frac{61}{3}$

i. $\frac{77}{5}$

j. $5\frac{2}{3}$

k. $\frac{19}{4}$

l. $5\frac{1}{4}$

m. $\frac{15}{2}$

n. $12\frac{1}{2}$

o. $\frac{18}{7}$

RULER II - CONCENTRATION

Worksheet II - Multiplication

Match Column A with Column B.

	COLUMN A	COLUMN B
_______ 1.	$2\frac{1}{2} \times 3\frac{1}{7}$	a. $1\frac{7}{8}$
_______ 2.	$3\frac{1}{3} \times 2\frac{1}{3}$	b. $5\frac{5}{9}$
_______ 3.	$4\frac{1}{4} \times 5\frac{1}{2}$	c. $21\frac{7}{9}$
_______ 4.	$\frac{1}{4} \times 7\frac{1}{2}$	d. $2\frac{14}{27}$
_______ 5.	$\frac{2}{9} \times \frac{3}{4}$	e. $10\frac{1}{2}$
_______ 6.	$5\frac{1}{2} \times \frac{1}{2}$	f. $2\frac{3}{4}$
_______ 7.	$6\frac{1}{3} \times 6\frac{1}{3}$	g. $7\frac{6}{7}$
_______ 8.	$7\frac{2}{3} \times 4\frac{1}{4}$	h. $26\frac{65}{80}$
_______ 9.	$10\frac{1}{2} \times 1$	i. $1\frac{7}{9}$
_______10.	$8\frac{1}{3} \times \frac{2}{3}$	j. $\frac{1}{6}$
_______11.	$2\frac{3}{5} \times 9\frac{1}{2}$	k. $40\frac{1}{9}$
_______12.	$5\frac{2}{3} \times \frac{4}{9}$	l. $62\frac{7}{12}$
_______13.	$\frac{2}{3} \times 2\frac{2}{3}$	m. $24\frac{7}{10}$
_______14.	$5\frac{5}{10} \times 4\frac{7}{8}$	n. $23\frac{3}{8}$
_______15.	$8\frac{1}{16} \times 6\frac{1}{12}$	o. 21

RULER II - CONCENTRATION

Worksheet III Division

Match Column A with Column B

COLUMN A	COLUMN B
______ 1. $2\frac{1}{3} \div 5\frac{1}{2}$	a. $\frac{3}{5}$
______ 2. $7 \div \frac{2}{3}$	b. $1\frac{23}{34}$
______ 3. $\frac{4}{8} \div \frac{6}{10}$	c. $\frac{1}{9}$
______ 4. $5\frac{2}{7} \div 7$	d. $10\frac{1}{2}$
______ 5. $\frac{4}{5} \div 1\frac{1}{3}$	e. 1
______ 6. $2\frac{1}{3} \div 4\frac{1}{8}$	f. $12\frac{1}{2}$
______ 7. $6\frac{2}{3} \div 6\frac{2}{3}$	g. $9\frac{1}{2}$
______ 8. $\frac{7}{8} \div 8\frac{1}{8}$	h. $\frac{14}{33}$
______ 9. $9\frac{1}{2} \div 5\frac{2}{3}$	i. 144
______10. $10\frac{2}{3} \div 8\frac{1}{2}$	j. $\frac{5}{6}$
______11. $10 \div \frac{4}{5}$	k. $18\frac{2}{3}$
______12. $\frac{8}{9} \div 8$	l. $1\frac{13}{51}$
______13. $12 \div \frac{1}{12}$	m. $\frac{37}{49}$
______14. $10\frac{2}{3} \div \frac{4}{7}$	n. $\frac{56}{99}$
______15. $6\frac{1}{3} \div \frac{2}{3}$	o. $\frac{7}{65}$

I. PROGRAM TITLE - "Introduction to Percents"

II. PROGRAM DESCRIPTION
   A. Students will view a brief tutorial section.
   B. Students will look at percents written in various ways.
   C. Students will change percents to decimals.
   D. Students will find the percent of given values.
   E. All problems are randomly generated.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide
   B. Worksheet - changing percents to decimals
   C. Worksheet - find the percent of a number
   D. Application Word Problems
   E. Additional Sources
      1. Mervin L. Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), Chapter 9, pp. 248-251.
      2. Merwin J. Lyung et al., Career Mathematics (Boston: Houghton Mifflin Co., 1974), Chapter 4, pp. 99-135.

V. SKILLS NEEDED
Rounding off numbers and multiplying decimals.

```
1 '*************************************************************
2 '*********   PERCENTS AND THEIR USES WITH MONEY   ************
3 '**  WRITTEN BY M. MC NEARNEY,M. MC ALISTER, J. DALY        **
4 '**  FOR COMP. ASSISTED VOC. MATH  -  NOVEMBER, 1980        **
5 '*************************************************************
6 CLEAR 300:CLS
7 FOR X = 1 TO 5:READ R$(X):NEXT
10 DIM Q$(21)
11 FOR X = 1 TO 21:READ Q$(X):NEXT
29 PRINT@512,"GOOD MORNING, WHAT IS YOUR NAME";:INPUTN$:GOTO 500
30 CLS:PRINT@463,"REWRITE EACH PERCENT AS A DECIMAL  "
35 FORN=1TO2000:NEXT:CLS
40 FORX=1TO20
50    P=RND(89)
60      PRINT@478,P;"%"
63 PRINT@90, "PROB.#"X
70 PRINT@640,"  ";:INPUT"YOUR ANSWER ";A
75 A1=A*100
80 IF INT(A1)=INT(P)OR INT(A1)=INT(P+1)OR INT(A1)=INT(P-1) THENPRI
NT@690,"CORRECT":C=C+1:ELSEPRINT@690,"SORRY":PRINT@704,"THE CORREC
T ANSWER IS  ";P/100
87 GOSUB 6000
89 CLS
90 NEXTX
100 PRINT@192, N$", YOUR SCORE ON THIS SECTION IS"(C/20)*100" %"
102 PRINT@320, "DO NOT GO ON UNTIL THE TEACHER SEES THIS GRADE!!"
104 GOSUB 6000
110 CLS
111 CLS
120 PRINT@450,"YOU WILL NEED A PENCIL AND PAPER FOR THE NEXT PART.
"
121 PRINT@578, "PLEASE ROUND OFF ALL ANSWERS TO THE NEAREST HUNDRE
DTHS!"
122 FORD=1TO3000:NEXT:CLS
123 C = 0
125 FORX=1TO20
126 PRINT@90, "PROB. #"X
130 A1=RND(99):A2=RND(99)
139 A$="$###.##  "
140      PRINT@470,"FIND "A1"% OF  ";:PRINT;:PRINT USING A$;A2*10
150     PRINT@640," ";:INPUT"YOUR ANSWER IS $";A4
160 IFINT(A4)=INT((A1)*(A2/10)) OR INT(A4)=INT((A1)*(A2/10)+1)ORIN
T(A4)=INT((A1)*(A2/10)-1)THENPRINT"CORRECT":C=C+1:GOTO180
163 PRINT@704,"SORRY , YOUR ANSWER IS NOT CORRECT."
164 PRINT "THE CORRECT ANSWER IS ";
165 B$="$###.## ":PRINT;:PRINT USINGB$;(A1*A2)/10
180 GOSUB 6000:CLS
185 NEXTX
190 CLS
200 PRINT@463,N$;" , YOUR SCORE IS ";(C/20)*100;" %"
210 PRINT@585, "PLEASE HAVE  THE TEACHER TO RECORD THIS GRADE"
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220 GOSUB 6000
230 CLS
240 C =0:PRINT@192, "IN THE SECTION, YOU WILL BE FINDING A DISCOUN
T ON ITEMS YOU     MIGHT PURCHASE IN YOU VOCATIONAL FIELD.
242 PRINT@320, "EACH ANSWER MUST BE ROUNDED OFF TO THE NEAREST CEN
T !!"
244 PRINT@448, "THERE WILL ONLY BE THREE ITEMS, SO BE CAREFUL "N$
250 GOSUB 6000
260 CLS
270 GOTO 4000
500 '************************************************************
510 '*************      TUTORIAL ON PERCENTS    ***************
515 '************************************************************
520 CLS
530 PRINT@400, "TODAY'S TOPIC IS PERCENT AND IT'S USES"
540 GOSUB 6000
550 CLS
555 PRINT@140, "PERCENT IS FOUND ALL AROUND YOU!!!"
560 PRINT@256,"LOOK AT THE SALES IN THE NEWSPAPERS, LABELS IN CLOT
HES, COMMIS- SIONS, INFLATION, ETC."
565 FOR N = 1 TO 1000: NEXT
570 PRINT@448, "PERCENT MEANS ":FOR N = 1 TO 30:PRINT@466,"
                        ":PRINT@466, "OUT OF ONE HUNDRED   ";:NEXT:PR
INT "OR PARTS PER HUNDRED."
575 FOR N = 1 TO 1000:NEXT
580 PRINT@576, "IN THIS LESSON, WE WILL TRANSLATE PERCENTS TO DECI
MALS BY USING THIS MEANING."
590 PRINT@768, "WE WILL REPLACE THE '%' WITH 2 DECIMAL PLACES TO M
EAN 100THS"
600 GOSUB 6000
602 CLS
604 PRINT@80, "REWRITE     55%    AS A DECIMAL"
606 PRINT@192, "THE RULE TO FOLLOW IS"
608 PRINT@325, "1. REMOVE THE PERCENT SYMBOL (%)"
609 GOSUB 5000
610 PRINT@453, "2. MOVE THE DECIMAL PLACE 2 PLACES TO THE LEFT."
611 GOSUB 5000
612 PRINT@576, "THEREFORE,   55%   WILL BE REWRITTEN AS    .55"
614 PRINT@704, "OTHERS ARE              3% = .03"
616 PRINT@789, "125% = 1.25"
618 PRINT@854, "73% = .73"
620 GOSUB 6000
622 CLS
624 PRINT@192, "lET'S USE THIS SKILL IN THIS PROBLEM, "N$
626 GOSUB 5000
628 PRINT@340, "FIND    35 %  OF  $245.00"
630 GOSUB 5000
632 PRINT@460, "FIRST, CHANGE THE PERCENT TO A DECIMAL!"
634 GOSUB 5000
636 PRINT@588, "SECOND, MULTIPLY THE DECIMAL AND THE BASE!"
640 GOSUB 5000
642 PRINT@716, "THIRD, ROUND OFF THE ANSWER TO THE NEAREST CENT!"
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644 PRINT@845, ".35  X   $245.00    =     $85.75"
650 GOSUB 6000
652 GOTO 30
3996 '**************************************************************
3997 '*******                 MENU                          ********
3998 '**************************************************************
4000 CLS
4010 PRINT@30, "MENU"
4020 PRINT@275, "1";TAB(25);"AUTOMOTIVE"
4030 PRINT@339, "2";TAB(25);"BEAUTY CULTURE"
4040 PRINT@403, "3";TAB(25);"CLIMATE CONTROL"
4050 PRINT@467, "4";TAB(25);"ELECTRICAL"
4060 PRINT@531, "5";TAB(25);"MED. DENTAL TECHNICIAN"
4070 PRINT@595, "6";TAB(25); "REC. VEHICLES"
4080 PRINT@659, "7";TAB(25); "BUILDING TRADES"
4090 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
4099 CLS
4100 PRINT@132, "% OFF          ITEM           TOTAL       DISC"
4101 GOSUB 9000
4120 U$="    %                %   $$##.##"
4123 V(1)=RND(10):V1(1)=RND(100)+RND(99)+100:V$(1)=STR$(V(1)):V1$(
1)=STR$(V1(1))
4125 PRINT@323, V(1)"%";:PRINT USING U$;Q$(Q),V1(1)
4130 V(2)=RND(20):V1(2)=RND(200)+RND(99)/100+100:V$(2)=STR$(V(2)):
V1$(2)=STR$(V1(2))
4135 PRINT@451,V(2)"%";:PRINT USING U$;Q$(Q+7),V1(2)
4140 V(3)=RND(9)+.5:V1(3)=RND(50)+RND(99)/100:V$(3)=STR$(V(3)):V1$
(3)=STR$(V1(3))
4145 U1$="   %                  %$$##.##"
4150 PRINT@579,V(3)"%";:PRINT USING U1$;Q$(Q+14),V1(3)
4155 GOSUB 9000
4160 F$="$$##.##":PRINT@364," ";:INPUT Z$:N=1:GOSUB 10000:Z$="$"+Z
$:PRINT@367,Z$;:PRINT@365," ";
4165 FOR X = 5 TO 112:SET(X,18):NEXT
4167 FOR Y = 19 TO 20:SET(5,Y):SET(21,Y):SET(66,Y):SET(86,Y):SET(1
12,Y):NEXT
4170 PRINT@492, " ";:INPUT Z$:N=2:GOSUB 10000:Z$="$"+Z$:PRINT@495,
Z$;:PRINT@493," ";
4175 FOR X = 5 TO 112:SET(X,25):NEXT
4177 FOR Y=24 TO 26 STEP 2:SET(5,Y):SET(21,Y):SET(66,Y):SET(86,Y):
SET(112,Y):NEXT
4180 PRINT@620," ";:INPUT Z$:N=3:GOSUB 10000:Z$="$"+Z$:PRINT@623,Z
$;:PRINT@621," ";
4185 FOR X = 5 TO 112:SET(X,32):NEXT
4187 FOR Y=30 TO 31:SET(5,Y):SET(21,Y):SET(66,Y):SET(86,Y):SET(112
,Y):NEXT
4200 GOSUB 6000
4210 CLS
4220 PRINT@384,N$ ", YOUR SCORE FOR THE VOCATIONAL QUIZ IS"(C/3)*1
00" %"
4230 PRINT@512, "PLEASE GET THIS RECORDED BY THE TEACHER!!"
4240 GOSUB 6000
4250 CLS
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4260 PRINT@384, "IT HAS BEEN A PLEASURE WORKING FOR YOU, "N$
4270 PRINT@512, "GOOD BYE FOR NOW!"
4280 GOTO 4280
5000 FOR N = 1 TO 1000: NEXT :RETURN
6000 PRINT@960, "PRESS C TO CONTINUE"
6001 I$=INKEY$:IF I$="C" THEN RETURN
6002 IF I$="S" THEN 6500
6003 GOTO 6001
6500 '*****************     STOP FEATURE     ********************
6501 CLS
6502 PRINT@512, "YOU HAD "C" PROBLEMS OUT OF "X" CORRECT FOR A SCO
RE OF"(C/X)*100" %"
6503 PRINT@576, "TO CONTINUE ENTER 'C'"
6504 PRINT@640, "TO GO TO THE MENU ENTER 'M'"
6505 PRINT@704, "TO END THE LESSON ENTER 'E'"
6506 INPUT Z$
6507 IF Z$="C" RETURN
6508 IF Z$="M":CLS:GOTO4000
6509 IF Z$ = "E" END
8000 '****************        DATA  LINES     ******************
8003 DATA "TERRIFIC!","GOOD WORK!","EXCELLENT!","LOVE IT","sUPER!"
8004 DATA GASKETS,HAIR BRUSHES,FILTERS,SWITCHES,TEST TUBES,CANS OF
 GLUE,BOX OF NAILS
8005 DATA FAN BELTS, HAIR CONDITIONER, DRAIN TROUGHS,FUSES,THROAT
SWABS,SPLASH GUARDS,HAMMERS
8006 DATA AIR FILTERS, PERMANENTS,CONDENSER COILS, CAPACITORS,CULT
URE DISHES,VENT COVERS,STAPLE GUNS
9000 '*******      GRAPH OF THE BILL WITH DISCOUNT     ********
9003 FOR X = 5 TO 112:SET(X,4):SET(X,11):SET(X,18):SET(X,25):SET(X
,32):NEXT
9004 FOR Y = 4 TO 32:SET(5,Y):SET(21,Y):SET(66,Y):SET(86,Y):SET(11
2,Y):NEXT
9005 RETURN
10000 '**************    SCORING FOR THE MENU QUIZ   ***********
10005 IF LEFT$(Z$,1)="$"THEN Z$=RIGHT$(Z$,(LEN(Z$)-1))
10010 X1 =(INT((VAL(V$(N))/100*VAL(V1$(N))+.005)*100))/100:X1$=STR
$(X1)
10020 IF  VAL(Z$)=VAL(X1$):L=RND(5):FOR NJ=1 TO 10:PRINT@843,"
                                             ":PRINT@858,R$(L):NEXT:C=C
+1:RETURN
10030 F$="$$##.##":PRINT@843,"SORRY, "N$", THE CORRECT ANSWER IS "
;:PRINT USING F$;X1
10040 RETURN
```

INTRODUCTION TO PERCENTS

Peer Tutoring Reference Guide

If we realize that the word per cent can be interpreted as per hundred, working with percents becomes easy.

Sample #1

$$42\% \text{ is } 42 \text{ per hundred} = \frac{42}{100} = .42$$

$$7\% \text{ is } 7 \text{ per hundred} = \frac{7}{100} = .07$$

$$20\% \text{ is } 20 \text{ per hundred} = \frac{20}{100} = .20$$

Sample #2

Often we are asked to find the % of a number. All we need to remember is that the word of can be replaced with a multiplication sign.

Find 70% of $210.00

First, if we recall from Sample #1, 70% means 70 per hundred or $\frac{70}{100}$ or .70.

$$.70 \overset{\text{of}}{\times} \$210.00 = \begin{array}{r} \$210.00 \\ \times\ .70 \\ \hline \$147.00 \end{array}$$

Sample #3

Now let's look at the process again.

200% means $\frac{200}{100}$ This can be simplified to 2, so

$$200\% = 2$$

The mechanics of it never change - the decimal is moved two places to the left

$$200\% = 2$$

Change 1.7% to a decimal

This means $\frac{1.7}{100}$ or $\frac{17}{1000}$ or .017; in other words, move the decimal point two places to the left: 1.7% = .017

INTRODUCTION TO PERCENTS

Worksheet

Change each of the following to a decimal.

1. 23% = __________
2. 18% = __________
3. 9% = __________
4. 42% = __________
5. 100% = __________
6. 720% = __________
7. 62% = __________
8. 38½% = __________
9. 51% = __________
10. 72% = __________
11. 7.2% = __________
12. .72% = __________
13. 68% = __________
14. 56% = __________
15. 500% = __________
16. .5% = __________
17. 1.8% = __________
18. 39% = __________
19. 4½% = __________
20. .005% = __________
21. 2.5% = __________
22. 82% = __________
23. 300% = __________
24. 45% = __________
25. 8.2% = __________

INTRODUCTION TO PERCENTS

Worksheet

Find each of the following. Round to the nearest hundredth when necessary.

1. 46% of $640 = __________

2. 53% of $180 = __________

3. 85% of $730 = __________

4. 95% of $380 = __________

5. 67% of $245 = __________

6. 43% of $86 = __________

7. 75% of $225 = __________

8. 2% of $436 = __________

9. 30% of $93 = __________

10. 8% of $168 = __________

11. 100% of $237 = __________

12. 49% of $245 = __________

13. 63% of $315 = __________

14. 97% of $820 = __________

15. 25% of $92 = __________

16. 5% of $23 = __________

17. 20% of $329 = __________

18. 77% of $240 = __________

19. 15% of $54 = __________

20. 1% of $19 = __________

INTRODUCTION TO PERCENTS

Application Word Problems

1. A beauty shop operator receives a 15% tip on a $20 cut and blow. How much is the tip?

2. An auto mechanic bills a customer $120. If 20% is for labor, what is the labor charge?

3. A dental technician receives a 12% raise. If the previous salary was $142, how much is the raise?

4. In 1978, it cost $22 to fill one tank of a camper with gasoline. If gasoline increased 200%, how much has it increased?

5. Electrical wiring has a 40% increase in price. If the original price of the electrical wire was $16 a roll, how much is the increase?

6. Last year a Luxaire air conditioning unit retailed for $1500. If Luxaire has an 18% increase, how much is the increase?

7. Decorative crown molding has an increase of 25%. If the original price of the molding was $4.20 a foot, how much is the increase?

I. PROGRAM TITLE - "Payroll"

II. PROGRAM DESCRIPTION
   A. Students will be guided through a tutorial lesson.
   B. Students will calculate wages for straight time.
   C. Students will calculate wages for overtime/time and a half.
   D. Students will find various deductions by using a percentage of gross wages.
   E. Random generation is used throughout the program.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide
   B. Worksheet
   C. Application Word Problems
   D. Additional Sources
      1. Mervin L. Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), Chapter 4, pp. 106-107.
      2. Edwin I. Stein, Refresher Mathematics (Boston: Allyn and Bacon, Inc., 1980), Section 6, pp. 542-546.

V. SKILLS NEEDED

All functions of whole numbers and decimals, multiplication using fractions and percentages.

```
1 '***********************************************************
2 '*********             PAYROLL                  **************
3 '*********         WRITTEN    BY                **************
4 '********* M. MCNEARNEY, J. DALY, M. MCALISTER   **************
5 '************************************************************
8 CLEAR 300:DIM C$(10):DIM D(10):T=0
9 CLS
10 PRINT@512,"GOOD MORNING, WHAT IS YOUR NAME";:INPUT A$:CLS
11 PRINT@512,"YOU WILL HAVE TO FIGURE OUT PAYROLLS AND FIND PERCEN
TS OF       SALARIES.  DO YOU WANT INSTRUCTIONS";:INPUT B$
12 CLS:IF B$="Y" OR B$="YES" GOSUB 8000:PRINT @512,;:INPUT"DO YOU
WISH TO REVIEW AGAIN";B$:GOTO 12
20 PRINT@512," wHAT IS THE NAME OF YOUR BUSINESS";:INPUT B$:CLS
30 PRINT "PLEASE ENTER THE LAST NAMES OF YOUR 10 EMPLOYEES"
40 FOR N=1TO10
50    INPUT C$(N)
60 NEXTN
65 CLS
70 FOR I=1TO10
80   D(I)=35+RND(15):E(I)=2.35 +RND(4)
90 NEXT I
95 PRINT
100 PRINT "THE TIME CARDS FOR YOUR EMPLOYEES SHOWS THE FOLLOWING"
105 IF RIGHT$(B$,1)="S" PRINT @ 212, B$"' PAYROLL":GOTO 115
110 PRINT@212, B$;" 'S PAYROLL"
115 PRINT TAB(5) "EMPLOYEE";TAB(30) "RATE";TAB(45) "HOURS"
118 E$="$#.##"
120 FORX1=1TO10
130 PRINT TAB(5) C$(X1);:PRINT TAB(30);:PRINT USING E$;E(X1);:PRIN
TTAB(45) D(X1)
140 NEXT X1
150 GOSUB 3000
155 CLS
160 PRINT@450, "YOU'LL NEED A PENCIL AND PAPER, "A$" ,TO DO THESE
PROBLEMS."
170 PRINT@578, "PLEASE ROUND OFF ALL ANSWERS TO THE NEAREST HUNDRE
DTHS."
180 GOSUB 3000
183 CLS
184 F$="$###.##"
185 FOR N=1TO10
186 PRINT @124,N
190 PRINT@256, "EMPLOYEE, "C$(N)", WORKED"D(N)"HOURS AT ";:PRINT;:
PRINT USING E$;E(N);: PRINT" DOLLARS PER HOUR."
195 PRINT@452,"PLEASE CALCULATE "C$(N)"'S GROSS PAY."
200 PRINT@516, " ";:INPUT "YOUR ANSWER";P
210 IF D(N)<=40 THEN P1=D(N)*E(N) ELSE P1=(E(N)*40)+((D(N)-40)*(1.
5*E(N)))
220 IF INT(100*P)=INT(100*P1) OR INT(100*P)=INT(100*P1)+1 OR INT(1
00*P)=INT(100*P1)-1 THEN PRINT@644, "THAT'S CORRECT, "A$:T=T+1 ELS
E PRINT@644,"SORRY, "A$" ,THE ANSWER IS ";:PRINT;:PRINT USING F$;P
1
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```
230 PRINT@708,"PLEASE CALCULATE 9% OF "C$(N)"'S GROSS SALARY FOR H
IS SAVINGS"
240 PRINT@872,"YOUR ANSWER";:INPUT S
250 S1=P1*.09
260 IF INT(100*S)=INT(100*S1)OR INT(100*S)=INT((100*S1)+1) OR INT(
100*S)=INT((100*S1)-1) THEN PRINT@908, "THAT'S CORRECT, "A$:T=T+1:
ELSE PRINT@908, "SORRY, "A$",  THE ANSWER IS ";:PRINT;:PRINT USING
 F$;S1
270 GOSUB 3000
275 CLS
280 NEXT
290 CLS:IF T>15 THEN PRINT@460,A$" , YOUR SCORE IS "INT ((T/(2*N))
*100)"%":PRINT@524,"IF A PAYROLL POSITION COMES UP, WE'LL RECOMMEN
D YOU.":ELSE PRINT@460, A$", YOUR SCORE IS  "INT((T/(2*N))*100)"%"
293 PRINT "            YOU HAD "T "CORRECT OUT OF"2*N
295 IF T=20 GOTO 4000
300 PRINT @596,"ENTER R TO RETURN TO TEST":PRINT @660,"ENTER M FOR
 MENU":INPUT"                              ";C$
310 IF C$="R" CLS: RETURN: ELSE 4000
3000 PRINT@960, "PRESS C TO CONTINUE."
3001 I$=INKEY$:IFI$="C" THEN RETURN
3002 IF I$="S" :CLS:GOTO 290
3003 GOTO3001
4000 CLS:PRINT@30,"MENU"
4010 PRINT@275,"1";TAB(25);"AUTOMOTIVE"
4020 PRINT@339,"2";TAB(25);"BEAUTY CULTURE"
4030 PRINT@403,"3";TAB(25);"CLIMATE CONTROL"
4040 PRINT@467,"4";TAB(25);"ELECTRICAL"
4050 PRINT@531,"5";TAB(25);"MED. DENT.TECH."
4060 PRINT@595,"6";TAB(25);"REC. VECHICLES"
4070 PRINT@659,"7";TAB(25);"BUILDING TRADES"
4080 PRINT@840," ";:INPUT"ENTER THE NUMBER OF YOUR VOCATIONAL FIEL
D";Q
4085 ON Q GOTO 6020,6100,6200,6300,6400,6500,6600
4090 F$="$$##.##"
6019 '*****************************************************
6020 '**************** AUTOMOTIVE ******************************
*************************************************************
6025 GOSUB9700:CLS:PRINT@64,"CORY'S AUTOBODY PAYS THEIR MECHANICS
BY THE HOUR":PRINT@128,"A MECHANIC MAKES $"R" PER HOUR AND WORKS"H
" HOURS":GOSUB 9500
6030 GOSUB9700:CLS:PRINT@64,"THE FENDER BENDER REPAIR SHOP PAYS TH
EIR MANAGER BY THE HOUR":PRINT@128,"IF THE MANAGER MAKES $"R" PER
HOUR AND WORKS"H1" HOURS,":GOSUB 9550
6035 GOSUB9700:CLS:PRINT@64,"BUILLE PONTIAC HAS RECENTLY CHANGED L
OCATIONS. THE SECRETARY":PRINT@128,"WANTS A RAISE. IF THE SECRETAR
Y WORKS"H" HOURS AT A RATE OF $":PRINT@192,R" PER HOUR AND SAVES 9
% OF THE SALARY,":GOSUB9600
6095 GOTO 9800
6098 '*************************************************************
*************** BEAUTY CULTURE ********************************
*********************************************************
6100 GOSUB9700:CLS:PRINT@64,"SHEMMY'S SALON HAS 10 OPERATORS."
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6110 PRINT@128,"IF THE HEAD OPERATOR IS PAID BY THE HOUR AND WORKS
"H" HOURS ONE":PRINT@192,"WEEK AT A RATE OF $"R" PER HOUR,":GOSUB
9500
6120 GOSUB9700:CLS:PRINT@64,"THE RECEPTIONIST AT THE 'HEAD HUNTERS
' IS PAID BY THE HOUR":PRINT@128,"AT A RATE OF $"R"FOR WORKING "H"
 HOURS LAST WEEK.":GOSUB 9500
6130 GOSUB9700:CLS:PRINT@64,"THE MANICURIST AT 'FINGERS' IS PAID B
Y THE HOUR AT A RATE":PRINT@128,"OF $"R" .IF THE MANICURIST WORKED
 "H" HOURS AND":PRINT@192,"SAVED 9% OF THE PAY,":GOSUB 9600
6195 GOTO 9800
6198 '*********** **********************************************
***************** CLIMATE CONTROL ******************************
*********************************************************
6200 GOSUB 9700:CLS:PRINT@64,"FINLEY'S HEATING & AIR CONDITIONING
PAYS THEIR SERVICE PERSONNEL":PRINT@128,"BY THE HOUR. IF BILLY JOE
 EARNS $"R" PER HOUR FOR "H" HOURS WORK,":GOSUB 9500
6220 GOSUB 9700:CLS:PRINT@64,"SUBZERO IS A LARGE REFRIGERATOR PLAN
T. THEY PAY THEIR TROUBLE-":PRINT@128,"SHOOTER $"R" PER HOUR FOR"H
" HOURS WORK":GOSUB 9500
6230 GOSUB9700:CLS:PRINT@64,"FROZEN FREEZERS SERVICES SEVERAL THOU
SAND ACCOUNTS ANNUALLY.":PRINT@128,"IF THEY PAY A PARTICULAR SERVI
CE PERSON $"R" AN HOUR":PRINT@194,"AND THAT PERSON WORKED"H" HOURS
 SAVING 9% OF THE PAY,":GOSUB 9600
6295 GOTO 9800
6298 '**********************************************************
*************** ELECTRICAL *************************************
*********************************************************
6300 GOSUB 9700:CLS:PRINT@64,"SHORT CIRCUIT ELECTRIC PAYS MOST OF
THEIR PERSONNEL BY THE HOUR":PRINT@128,"IF THE NEWEST EMPLOYEE MAK
ES $"R"PER HOUR AND WORKED"H"HOURS":PRINT@192,"LAST WEEK,":GOSUB 9
500
6310 GOSUB9700:CLS:PRINT@64,"ATOMIC BLAST CHEMICAL'S STARTING SALA
RY IS $"R" PER HOUR.":PRINT@128,"IF AN ELECTRICIAN WORKED A TOTAL
OF"H" HOURS LAST WEEK,":GOSUB 9500
6320 GOSUB 9700:CLS:PRINT@64,"IN THE PREVIOUS EXAMPLE THE TOTAL SA
LARY WAS $"X".IF THE ":PRINT@128,"EMPLOYEE SAVED 9% OF THE SALARY,
":GOSUB 9600
6395 GOTO 9800
6398 '**********************************************************
****************** MED. DENT. TECH. ****************************
*********************************************************
6400 GOSUB 9700:CLS:PRINT@64,"A DENTAL HYGENIST WHO WORKS FOR DOCT
OR DOOLITTLE IS PAID $"R:PRINT@128,"AN HOUR. IF THE HYGENIST WORKE
D"H"HOURS,":GOSUB 9500
6410 GOSUB 9700:CLS:PRINT@64,"A MEDICAL RECEPTIONIST WORKED"H"HOUR
S LAST WEEK AT A RATE OF":PRINT@128,"$"R" PER HOUR,":GOSUB 9500
6420 GOSUB 9700:CLS:PRINT@64,"A NURSE AT OVER-THE-HILL NURSING HOM
E WORKS"H"HOURS A WEEK.":PRINT@128,"IF THE SALERY THE NURSE RECIEV
ES IS $"R"PER HOUR,":GOSUB9500
6495 GOTO 9800
6497 '***************************
6498 '***************************
6499 '***** REC. VEC. ***********
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6500 GOSUB 9700:CLS:PRINT@64,"A MECHANIC ON THE STATEN ISLAND FERR
Y MAKES $"R"PER HOUR.":PRINT@128,"IF THE TOTAL HOURS THAT WERE PUT
 IN WAS"H",":GOSUB9500
6510 GOSUB9700:CLS:PRINT@64,"CAMPERS UNLIMITED EMPLOYEES MAKE  $"R
" PER HOUR AND WORK"H" HOURS.":GOSUB 9500
6520 GOSUB9700:CLS:PRINT@64,"IF HONDASAWKI PAYS THEIR RECEPTIONIST
S $"R"PER HOUR AND THEY":PRINT@128,"WORK"H"HOURS SAVING 9% OF THEI
R PAY,":GOSUB9600
6595 GOTO 9800
6597 '****************************
6598 '***** BUILDING TRADES ****
6599 '****************************
6600 GOSUB 9700:CLS:PRINT@64,"R&C CONSTRUCTION CO. OF NORTH FIELD
N.Y. PAYS THEIR CARPENTERS":PRINT@128,"$"R"PER HOUR. IF THE CARPEN
TERS WORK"H"HOURS A WEEK,":GOSUB9500
6610 GOSUB9700:CLS:PRINT@64,"AN AVERAGE ROOFER IS PAID $"R"PER HOU
R. IF THE ROOFER":PRINT@128,"WORKED"H"HOURS":GOSUB9500
6620 GOSUB9700:CLS:PRINT@64,"ALCO ALUM. SIDING PAYS THEIR WORKERS
$"R"AN HOUR.IF A WORKER":PRINT@128,"WORKED"H"HOURS ONE WEEK AND SA
VED 9% OF THE PAY,":GOSUB9600
6695 GOTO 9800
8000 PRINT"                    HIT SPACE BAR TO CONTINUE":PRINT "S
TRAIGHT TIME IS THE HOURLY RATE THAT IS GIVEN FOR THE FIRST 40 HOU
RS OF WORK.  AFTER 40 HOURS, TIME AND A HALF SHOULD BE PAID."
8002 GOSUB8200
8004 PRINT:PRINT"TIME AND A HALF = HOURLY RATE X 1 1/2."
8006 GOSUB8200
8008 PRINT:PRINT"FOR EXAMPLE, MIKE WORKS 48 HOURS.  HIS REGULAR RA
TE OF PAY IS   $3.50.  THIS IS PAID FOR THE FIRST 40 HOURS.  THERE
FORE, HE IS  PAID";
8010 GOSUB8200
8012  PRINT"                    40 X $3.50 = $140.00":GOSUB8200
8014 :PRINT"AFTER THAT";
8016  PRINT"               48 HOURS - 40 HOURS = 8 HOURS OVERTIME
8017 GOSUB8200
8018 PRINT"THESE ADDITIONAL 8 HOURS OVERTIME ARE PAID AT TIME AND
A HALF.                ($3.50 X 1 1/2 = $5.25)"
8019 GOSUB8200
8020 PRINT"TIME AND A HALF FOR MIKE IS $5.25 PER HOUR. SINCE HE WO
RKED      48 HOURS, HE SHOULD BE PAID
8021 GOSUB8200
8023 CLS:PRINT@404,"40 X $3.50 = $140.00"
8025 PRINT @468," 8 X $5.25 =   42.00"
8027 PRINT @532,"              ";:PRINTSTRING$(7,CHR$(95))
8029 PRINT @595,"OR A TOTAL OF $182.00"
8031 GOSUB8200
8033 CLS:PRINT"                    HIT SPACE BAR TO CONTINUE":PR
INT" IF JAN HAS 9% OF HER GROSS WAGES TAKEN OUT FOR A SAVINGS PLAN
, THE FOLLOWING WILL SHOW YOU HOW MUCH WILL BE DEDUCTED."
8034 GOSUB8200
8035 PRINT:PRINT "SUPPOSE HER GROSS PAY WAS $67.00.  WE WANT TO FI
ND 9% OF $67.00."
8036 GOSUB8200
```

```
8038  PRINT" WHEN WE SEE THE WORD OF WE CAN REPLACE IT WITH A MULT
IPLICATION SIGN ";:FOR N=1TO200:PRINT@406,"  ":PRINT@406,"OF":NEXT
8039 PRINT " SIGN SO, 9% OF $67.00 = 9% X $67.00"
8040 GOSUB8200
8042 PRINT:PRINT"NOW LET'S CHANGE THE PERCENT TO A DECIMAL.  THIS
IS DONE BY REPLACING THE % SIGN WITH THE WORDS 'PER HUNDRED' AND S
O 9% BECOMES 9/100 OR .09
8044 PRINT:PRINT "                        .09 X $67.00 = $6.03"
8046 PRINT"                    SO 9% OF $67.00 = $6.03
8048 GOSUB8200
8050 CLS:RETURN
8200 Z$=INKEY$:IF Z$=" " RETURN ELSE 8200
9500 PRINT@256,"CALCULATE THE GROSS PAY":INPUT G:GOSUB 9750
9501 RETURN
9550 PRINT@256, "CALCULATE THE GROSS PAY":INPUT G:GOSUB 9790
9551 RETURN
9600 PRINT@256,"CALCULATE THE SAVINGS":INPUT G:GOSUB9770
9601 RETURN
9700 R=RND(10)+.65+2:H = RND(8)+32:H1=RND(5)+35
9701 RETURN
9750 F$="$$##.##":X=INT(((R*H)+.005)*100)/100 :IF G = X THEN PRINT
"SUUPER!!  YOU GOT IT RIGHT!":K=K+1:ELSE PRINT"SORRY,  THE CORRECT
 ANSWER IS ";:PRINT USING F$;X
9755 GOSUB 3000
9760 RETURN
9770 X=INT(((R*H*.09)+.005)*100)/100:IF X=G PRINT"SUUUUUPER!!!! YO
U GOT IT RIGHT":K=K+1:ELSE PRINT"SORRY! THE CORRECT ANSWER IS ";:P
RINT;:PRINT USING F$;X
9775 GOSUB 3000
9780 RETURN
9790 X=INT(((R*H1)+.005)*100)/100
9792 IF G=X THEN PRINT"TERRIFIC - YOU GOT IT RIGHT!":K = K+1:ELSE
PRINT "SORRY! THE CORRECT ANSWER IS ";:PRINT;:PRINT USING F$;X
9793 GOSUB 3000
9794 RETURN
9800 CLS:PRINT@450,"YOUR SCORE FOR THIS SPECIAL SECTION WAS "(K/3)
*100"%":GOSUB 3000
9810 CLS
9820 PRINT@384, A$", HOPE YOU HAD TERRIFIC GRADES AND LOTS OF FUN!
"
9830 PRINT@512, "I AM LOOKING FOWARD TO WORKING WITH YOU AGAIN AND
 AGAIN!"
9840 GOTO9840
```

PAYROLL

Peer Tutoring Reference Guide

Before we enter the working world, it is to our advantage to be able to calculate our own wages. If we are paid by the hour, this calculating is simple, once we know the number of hours that we work and our hourly rate of pay. For example, Joe works 20 hours a week, and his rate of pay is $3.35 per hour. What is his gross pay? Before solving this problem, we need to define gross pay. Gross pay is Joe's total earnings for the week before any deductions are taken out.

Gross Pay = number of hours worked x hourly rate

= 20 x $3.35

Gross Pay = $67.00

Straight time is the hourly rate that is given for the first 40 hours of work. After 40 hours, time and a half is often paid.

Time and a half = hourly rate x 1½

For example, Sue works 48 hours. Her regular hourly rate of pay if $3.50. This is paid for the first 40 hours. Therefore, she is paid

40 x $3.50 = $140.00

After that

48 hours - 40 hours = 8 hours overtime

These additional 8 hours overtime are paid at time and a half.
($3.50 x 1½ = $5.25)

Time and a half for Sue will be $5.25 per hour. Since she worked 48 hours, she should be paid

40 x $3.50 = $140.00
8 x $5.25 = 42.00
or a total of $182.00

Many deductions can be taken from your pay check: Federal Income Tax, State Income Tax (where applicable), and Social Security just to name a few. The amount of money that you actually take home is called your net pay.

Net Pay = Gross Pay - any deductions

Peer Tutoring Reference Guide, continued

Net Pay = Gross Pay - any deductions

If Joe has 9% of his gross wages (pay) taken out for a savings plan, how much will be deducted?

First, remember Gross pay = number of hours x hourly rate

Gross pay = $67.00

Now, let's look at the problem:

9% of gross pay

9% of $67.00

When we see the word "of" we can replace it with a multiplication sign so,

$$\underset{(\text{of})}{9\% \times} \quad \$67.00$$

Now let's change the percent to a decimal. This is done by replacing the % sign with the words "per hundred" and so 9% becomes

$$\frac{9}{100} \quad \text{or} \quad .09$$

.09 x $67.00 = $6.03

so 9% of $67.00 = 6.03

PAYROLL

Worksheet

Fill in the business name and the names of the ten employees.

Your Business is "__________________________"
You have 10 employees

	NAME	HOURS WORKED	HOURLY RATE	GROSS PAY	SAVINGS OF	AMOUNT SAVED
1.		20	$3.35		8%	
2.		36	$3.40		7%	
3.		48	$3.35		9%	
4.		28	$3.50		10%	
5.		50	$3.75		6%	
6.		47	$4.10		9%	
7.		40	$6.10		8%	
8.		43	$5.45		7%	
9.		45	$5.90		6%	
10.		20	$4.50		7%	

Remember, employees who work over 40 hours received overtime pay (time and a half).

PAYROLL

Application Problems

This worksheet is designed to help you solve word problems dealing with payroll. Some of the problems use straight time, others use time and a half. You will also see some multi-stepped problems. First, read each problem carefully, then decide what information is necessary.

For example: Last week "LaChalet" Beauty Salon was open from 9 a.m. until 9 p.m. every day. An operator is paid $3.35 per hour. If the operator works 40 hours, what is the gross pay?

Here we see that the hours the shop was open was not needed to solve the problem. All that we had to know was the hourly rate ($3.35) and the number of hours worked (40).

$3.35 x 40 = $134.00

1. R & C Construction Company of North Field, New Jersey pays their carpenters by the hour. If a carpenter works 45 hours at $12.00 an hour, what is the gross pay (hint: overtime must be added after 40 hours)?

2. Shemmy's Salons has 12 operators. If the head stylist is paid by the hour and worked 53 hours last week at $4.20 per hour, what will be the gross pay?
If the stylist saves 9% of the gross pay, how much did she save last week?

3. Cory's Autobody pays their mechanics by the hour. If a mechanic makes $10.75 per hour and works 46 hours, what will the gross pay be?

4. A mechanic on Staten Island Ferry is paid by the hour. If the mechanic makes $11.50 per hour and works 42 hours, what will the gross pay be?

Application Problems, Continued

5. Finnley's Heating and Air Conditioners pays their service personnel by the hour. If Sandy earns $6.30 per hour and works for 54 hours, what will the gross pay be?

6. JCP&L pays their service personnel by the hour. If the newest employee makes $4.50 per hour and works for 46 hours, what will the gross pay be?

7. A dental hygienist who works for Dr. Doolittle is paid by the hour. If the hygienist works 40 hours at the rate of $5.15 per hour, what is the gross pay?

I. PROGRAM TITLE - "Metric Measure - Length"

II. PROGRAM DESCRIPTION
  A. Students will view tutorial section (refer to Peer Tutoring Reference Guide).
  B. Students will match objects with their approximate lengths.
  C. Students will make metric conversions from larger quantities to smaller quantities and the reverse.
  D. General section uses data lines.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
  A. Peer Tutoring Reference Guide
  B. Worksheet
    1. Objects and Their Approximate Length
    2. Conversion Within the Metric System
  C. Application Word Problems
  D. Additional Sources
    1. Edwin I. Stein, Refresher Mathematics (Boston: Allyn and Bacon, 1980), pp. 288-293.
    2. Sadie C. Brag et al., General Mathematics Skills and Applications (Morristown, New Jersey: Silver Burdett, 1979), pp. 205-207.
    3. Francis G. Larkford, Consumer Mathematics (Boston: Allyn and Bacon, 1981), pp. 125-129.

V. SKILLS NEEDED

Reading and using place value charts; multiplication and division of decimals and whole numbers.

```
2 '********************************************************
3 '*********** METRIC LESSON METER-LENGTH    ***************
4 '***********      WRITTEN BY            *****************
5 '*********** J.DALY,M.MCALISTER,M.MCNEARNEY ***************
6 '*********** FOR COMP. ASS'T VOC MATH   *****************
7 '***********            DEC. 1980       ******************
8 '*********************************************************
9 CLEAR 500:DIM I$(15),J$(15),K$(15),L$(15),S$(21)
100 CLS:PRINT @512, "GOOD MORNING, WHAT IS YOUR NAME";:INPUTA$
102 CLS:PRINT@512,"TODAY'S LESSON WILL BE ON THE METER. DO YOU WIS
H TO REVIEW";:INPUT A1$
103 IF A1$="Y" OR A1$="YES" CLS:GOSUB 8000:CLS:PRINT@512,"DO YOU W
ISH TO REVIEW AGAIN";:INPUTA1$:IF A1$="Y"OR A1$="YES" GOTO 103
970 CLS:PRINT@468,"  *****  SECTION  1  *****  ":PRINT@536, " ONE
MOMENT PLEASE"
980 FOR N=1 TO 1500:NEXT:CLS
1000 DATA HEIGHT OF FOOTBALL POSTS, 6 M,HEIGHT OF A BOWLING PIN,38
 CM,LENGTH OF A BASKETBALL COURT, 28 M,LENGTH OF A FOOTBALL,28 CM,
 LENGTH OF A BASEBALL BAT, 1 M
1005 DATA LENGTH OF A ROLLER SKATE, 25 CM, DISTANCE AROUND A RACET
RACK, 2 KM, LENGTH OF A CANOE, 4 M, HEIGHT OF A BASKETBALL NET, 3
M, THICKNESS OF A NEEDLE, 1 MM
1050 FOR N=1TO10:READA$(N),B$(N):NEXT
1060 FOR N=1TO10
1070   X=RND(10)
1080   IF A$(X)="0" THEN GOTO 1070
1085  C$(N) = A$(X):D$(N) = B$(X)
1090  A$(X)="0"
1100 NEXT
1110 CLS
1120 FOR N=1TO10
1125 PRINT@180, "PROB.# " N
1130 PRINT@128,"FROM THE LIST ON THE RIGHT, CHOOSE";
1135 PRINT@192, "tHE MOST REASONABLE MEASUREMENT";
1140 PRINT@256,"FOR THE "
1150 PRINT@320, C$(N);
1160 FOR P=1TO10
1170  PRINT@(170+64*(P-1)),B$(P);:NEXT
1175 FOR M=1 TO100:                              PRINT@320,"
                         ";:PRINT@320,C$(N);:NEXT
1180 PRINT@704, " ";:INPUT "YOUR CHOICE IS";K$
1190 IF VAL(K$)=VAL(D$(N)) THEN PRINT@832,A$", tHAT IS CORRECT!!!"
:C=C+1:ELSE PRINT@832, A$", TOO BAD, THE CORRECT ANSWER IS ";D$(N)
1200 GOSUB 6000
1210 CLS: NEXT
1220 CLS: GOSUB 7000
1230 GOSUB 6000
1240 CLS
1250 PRINT@468, " *****  SECTION  2  ***** ":PRINT@536, " ONE MOME
NT PLEASE"
1260 FOR N=1 TO1000: NEXT:CLS
```

```
1270 DATA THICKNESS OF A PIN, MM, LENGTH OF A PENCIL, CM, LENGTH O
F A FOOTBALL FIELD, M, DISTANCE BETWEEN CITIES, KM, LENGTH OF A SH
OE, CM
1275 DATA LENGTH OF A DRIVEWAY, M, HEIGHT OF A DOOR, M, LENGTH OF
THE MISSISSIPPI,KM, HEIGHT OF A COOKIE JAR, CM, THICKNESS OF AN EY
ELASH,MM
1280 FOR N=1TO10
1290   READ E$(N),F$(N)
1300 NEXT
1310 FOR N=1TO 10
1320   X=RND(10)
1330   IF E$(X)="0" THEN 1320
1340   G$(N) = E$(X): H$(N) =F$(X)
1350   E$(X) = "0"
1360 NEXT
1370 FOR N=1 TO 10
1380   PRINT@180, "PROB. # "N
1390   PRINT@128, "FROM THE LIST ON THE RIGHT, CHOOSE ";
1400   PRINT@192, "THE MOST REASONABLE UNIT OF MEASURE";
1410   PRINT@256, "FOR THE "
1420   PRINT@320, G$(N);
1430   FOR P = 1 TO 10
1440     PRINT@(170+64*(P-1)), F$(P);
1443   NEXT
1450   FOR R = 1 TO 100:PRINT@320,"
        ";:PRINT@320,G$(N);
1460 NEXT
1470 PRINT@704," ";:INPUT "YOUR CHOICE IS ";K$
1480 IF K$ = H$(N) THEN PRINT@832,A$ ", KEEP UP THE GOOD WORK!!!":
C=C+1:ELSE PRINT@832,"TOO BAD, "A$", THE ANSWER WAS "H$(N)
1490 GOSUB 6000
1500 CLS: NEXT
1510 GOSUB 7000
1520 GOSUB 6000
1524 CLS:PRINT@468, " *****  SECTION 3  *****"
1525 FOR N=1 TO 1500:NEXT
1530 CLS
1540 DATA 600 CM =       M,6,381 CM =          M,3.81, 2800 M =
  KM, 2.8, 3.5 KM =       M, 3500, 2.8 M =          MM,2800
1545 DATA 10 DM=      M,1, 10 DAM =       M, 100 M, 5.2 CM =     M,
 .052, 125 MM =       M, .125, 25 HM =      KM, 2.5
1550 DATA 6 M=     MM, 6000, 1000 M =       KM,1, 100 M =      DAM
,10, .001 M =       MM,1, .01 M =      CM,1
1560 FOR N=1 TO 15
1570   READ I$(N),J$(N)
1580 NEXT
1590 FOR N = 1 TO 15
1600   X = RND(15)
1610   IF I$(N) = "0" THEN 1600
1620   K$(N) = I$(N): L$(N) = J$(N)
1630   I$(N) = "0"
```

```
1640 NEXT
1645 C=0
1650 FOR N=1 TO 15
1660    PRINT@180, "PROB. # " N
1670    PRINT@256, " PLEASE INDICATE THE NUMERICAL VALUE FOR EACH
1680 PRINT@468, K$(N)
1690 PRINT@704, " ";:INPUT "YOUR ANSWER IS ";K$
1700 IF VAL(K$) = VAL(L$(N)) THEN PRINT@832, A$ ", YOU KNOW YOUR M
ETRICS!":C=C+1:ELSE PRINT@832,"SORRY, THE CORRECT ANSWER IS " L$(N
)
1710 GOSUB 6000
1720 CLS:NEXT
1730 PRINT@448, A$ ", YOUR SCORE FOR THIS SECTION IS "(C/15)*100 "
 %"
1740 GOSUB 6000
1750 CLS:GOTO4000
4000 CLS
4010 PRINT@30,"MENU"
4020 PRINT@275,"1";TAB(25);"AUTOMOTIVE"
4030 PRINT@339,"2";TAB(25);"BEAUTY CULTURE"
4040 PRINT@403,"3";TAB(25);"CLIMATE CONTROL"
4050 PRINT @467,"4";TAB(25);"ELECTRICAL"
4060 PRINT @531,"5";TAB(25);"MED. DENT. TECH."
4070 PRINT @595,"6";TAB(25);"REC. VEHICLES"
4080 PRINT @659,"7";TAB(25);"BUILDING TRADES"
4090 PRINT @840,;:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FIELD
";Q
4095 CLS:GOTO9500
6000 PRINT@896, "PRESS C TO CONTINUE"
6001 K$ = INKEY$:IF K$ = "C" THEN RETURN ELSE 6001
7000 CLS:PRINT@448, A$", YOUR SCORE FOR THIS SECTION IS "(C/10)*10
0 " %":C=0
7001 RETURN
8000 CLS:PRINT@398, " A METER"
8050 FOR X=1TO78:SET(X,10):SET(X,15):NEXT
8051 FOR Y=10 TO15:SET(1,Y):SET(78,Y):NEXT
8052 FOR X=1TO72:SET (X,25):SET(X,30):NEXT:FOR Y=25 TO30:SET(1,Y):
SET(72,Y):NEXT
8060 PRINT@707, "IS SLIGHTLY LONGER THAN A YARD"
8065 GOSUB6000
8067 CLS: PRINT"                    PRESS SPACE BAR TO CONTINUE"
8069 PRINT:PRINT "  WHILE A YARD IS 36 INCHES A METER IS APPROXIMA
TELY 39 INCHES."
8070 GOSUB 9000
8072 PRINT: PRINT "THEREFORE, WE SHOULD TRY TO VISUALIZE LENGTHS I
N TERMS OF METERS INSTEAD OF YARDS."
8074 GOSUB9000
8080 PRINT:PRINT"FOR EXAMPLE, THE HEIGHT OF A BASKETBALL NET WOULD
 BE ABOUT 3    METERS INSTEAD OF ALMOST 4 YARDS."
8082 GOSUB9000
8084 PRINT:PRINT"THE BEST WAY TO LEARN THE METRIC SYSTEM IS TO THI
NK OF THE      LENGTH OF FAMILAR ITEMS IN TERMS OF METERS , CENTIM
ETERS, OR    KILOMETERS RATHER   THAN MEMORIZING SOME COMPLICATED
CONVERSION FORMULAS."
```

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8086 GOSUB9000
8090 CLS:PRINT"OF COURSE,  YOU MUST KNOW THE RELATIONSHIP BETWEEN
THE METRIC    LENGTHS. YOU MIGHT WANT TO COPY THE FOLLOWING:
8092 GOSUB9000
8094 PRINT:PRINT "                    KILOMETER   (KM) = 1000 M
8096 PRINT:PRINT "                    HECTOMETER (HM) =  100 M
8098 PRINT:PRINT "                    DEKAMETER (DAM) =  10 M
8100 PRINT:PRINT "                    METER       (M)
8102 PRINT:PRINT "                    DECIMETER  (DM)  =  1/10  M
8104 PRINT:PRINT "                    CENTIMETER (CM)  =  1/100  M
8106 PRINT:PRINT "                    MILLIMETER (MM)  =  1/1000 M
8110 GOSUB9000
8112 RETURN
9000 Q$=INKEY$:IFQ$=" " RETURN ELSE 9000
9010 GOTO9010
9500 C=0:FOR N=1TO21:READ S$(N):NEXT
9505 PRINT @180,"PROBLEM #1"
9510 PRINT@256, S$(Q) " WOULD MOST LIKELY HAVE THEIR LENGTH MEASUR
ED IN"
9511 PRINT @347,"CENTIMETERS":PRINT@411,"METERS":PRINT@475,"KILOME
TERS"
9512 PRINT @608,;:INPUTS1$
9515  IF  S1$="CENTIMETERS" PRINT @720, "THAT'S CORRECT, "A$:C=C+1
:ELSE PRINT @720, "SORRY, "A$", THE CORRECT ANSWER IS CENTIMETERS.
"
9517 GOSUB6000
9519 CLS: PRINT @180,"PROBLEM #2"
9520 PRINT @256, S$(Q+7) " WOULD MOST LIKELY HAVE THEIR LENGTH MEA
SURED IN "
9521 PRINT @347,"MILLIMETERS":PRINT@411,"METERS":PRINT@475,"KILOME
TERS"
9522 PRINT@608,;:INPUT S1$
9525 IF S1$="METERS" PRINT @720,"THAT'S CORRECT, "A$:C=C+1:ELSE PR
INT@720,"SORRY, "A$", THE CORRECT ANSWER IS METERS."
9527 GOSUB6000
9530 CLS:PRINT@180,"PROBLEM #3"
9531 PRINT@256, "A  "S$(Q+14)" WOULD MOST LIKELY BE MEASURED IN"
9532 PRINT@347,"MILLIMETERS":PRINT@411,"METERS":PRINT@475,"CENTIME
TERS"
9535 PRINT@608,;:INPUTS1$
9537 IF S1$="CENTIMETERS" THEN PRINT@720,"THAT'S CORRECT, "A$:C=C+
1:ELSE PRINT@720, "SORRY, "A$", THE CORRECT ANSWER IS CENTIMETERS"
9540 GOSUB6000
9542 CLS: PRINT @512, A$", YOUR SCORE FOR THIS SECTION IS "(C/3)*1
00"%.  GOODBYE, AND HAVE A NICE DAY"
9550 GOTO 9550
10000 DATA SCREWS, HAIR CLIPS, SMALL CLAMPS, SMALL SWITCHES, SYRIN
GES,NUTS,NAILS
10002 DATA OIL TANKS, LARGE MIRRORS, REFRIGERATION UNITs, GROUND W
IREs,DENTAL CHAIRS, RECREATIONAL VEHICLES, CEILING BEAMS
10004 DATA A CAN OF OIL,A BOTTLE OF SHAMPOO, A CAN OF ANTIFREEZE,
A SWITCH,A BOTTLE OF ASPERIN, A CAN OF OIL,A NAIL
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METRIC MEASURE - LENGTH

Peer Tutoring Reference Guide

The basic unit of length in the metric system is the meter. The meter is popping up all around us. The speedometer in our cars is no longer based strictly on miles - the kilometer has been introduced. Speed limits on roadways often give the speed per hour in kilometers. Athletes see the meter used in running and throwing events. Here, you may ask yourself, "but how long is a meter?" A meter is slightly longer than a yard.

Since many objects are much longer and shorter than a meter, prefixes are added to the basic unit. And so we can now look at:

KILOmeter	HECTOmeter	DEKAmeter
1000 meters	100 meters	10 meters

DECImeter	CENTImeter	MILLImeter
$\frac{1}{10}$ meter	$\frac{1}{100}$ meter	$\frac{1}{1000}$ meter
.1 meter	.01 meter	.001 meter

And items that use these measures could be:

diameter of a nickel $\underset{\text{equals approx.}}{\doteq}$ 2 cm

distance around the world $\underset{\text{equals approx.}}{\doteq}$ 40,000 kilometers

width of the lead in a pencil $\underset{\text{equals approx.}}{\doteq}$ 1 mm

EXAMPLE 1

9 km = ________ m

Here we are going from a larger unit to a smaller unit and so multiplication is the order of operation. Since we are moving 3 places, we multiply by 1000 so that

9 x 1000 = 9,000 m

EXAMPLE 2

350 mm = _______ dm

In this problem, we are moving from a smaller quantity to a larger quantity so division is the operation to perform. Since the place value is 2 units to the left, we must divide by 100

$$100\overline{)350.0} = 3.5$$

350 mm = 3.5 dm

METRIC MEASURE - LENGTH

Worksheet I

Match Column A and Column B. Each item is used only once. Remember that these are only approximations.

COLUMN A

_______ 1. Earth's diameter

_______ 2. the thickness of a perm rod

_______ 3. the length of a switch plate

_______ 4. the width of a five-bay garage

_______ 5. the height of truck tire

_______ 6. one thickness of a piece of electrical wiring

_______ 7. the height of a one-story school

_______ 8. the length of a motorcycle

_______ 9. the width of an interior door

_______ 10. the height of a room

COLUMN B

a. 1.5 meters

b. 3 meters

c. .7 hm

d. 13000 km

e. 1 dam

f. 1 m

g. 2 cm

h. 10 dm

i. 1 dm

j. 1 mm

METRIC MEASURE - LENGTH

Worksheet II

Converting metric units of length.

1. 8.2 km = ________ m
2. 9 dam = ________ dm
3. 92 m = ________ cm
4. .008 km = ________ mm
5. 93 m = ________ hm
6. 700 dam = ________ mm
7. .02 km = ________ cm
8. 44 mm = ________ cm
9. 4800 mm = ________ m
10. .66 km = ________ hm
11. 285,000 mm = ________ km
12. 8.4 cm = ________ mm
13. 66 m = ________ dam
14. 2.7 km = ________ m
15. .29 hm = ________ cm
16. .84 dam = ________ dm
17. 470 dm = ________ m
18. .36 m = ________ cm
19. 93 cm = ________ mm
20. 4000 m = ________ cm

METRIC MEASURE - LENGTH

Application Word Problems

1. If an electrician has 1000 km of copper wire, this is equivalent to:

__________ hm

__________ dam

__________ m

__________ dm

__________ cm

__________ mm

2. If the height of a shampoo chair is .1 dam, this is equivalent to:

__________ km

__________ hm

__________ m

__________ dm

__________ cm

__________ mm

3. If the height of a ladder is 3 m, this is equivalent to:

__________ km

__________ hm

__________ dam

__________ dm

__________ cm

__________ mm

Application Word Problems, Continued

4. If the length of an auto bay is 2 dam, this is equivalent to:

__________ km

__________ hm

__________ m

__________ dm

__________ cm

__________ mm

5. If the circumference of a sewer pipe is 124 cm, this is equivalent to:

__________ km

__________ hm

__________ dam

__________ m

__________ dm

__________ mm

I. PROGRAM TITLE - "Meter Concentration"

II. PROGRAM DESCRIPTION
   A. This program has four facets each of which is described below.
      1. Students will match metric units.
      2. Students will match metric equivalents (level I).
      3. Students will match metric equivalents using more difficult measures.
      4. Students will use metric prefixes and key words.

   B. General Section uses data lines.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. See Peer Tutoring Reference Guide for the Meter (#13).
   B. Worksheets
      1. Prefixes - matching
      2. Additional Problems
   C. Additional Sources
      1. Edwin I. Stein, Refresher Mathematics (Boston: Allyn and Bacon, 1980), pp. 288-293.
      2. Sadie C. Bragg et al, General Mathematics (Morristown, New Jersey: Silver Burdett, 1979), pp. 205-207.
      3. Francis G. Larkford, Consumer Mathematics (Boston: Allyn and Bacon, 1981), pp. 128-129.

V. SKILLS NEEDED
Reading and using place value charts, multiplication and division of decimals and whole numbers.

THE FOLLOWING DATA LINES BELONG TO PROGRAM # 14

THEY ARE TO BE USED IN THE MAIN CONCENTRATION PROGRAM FOUND IN PROGRAM # 10

YOUR OWN VERSION CAN BE ACHIEVED BY REPLACING LINES 1000-1004 WITH YOUR OWN DATA IN THE SAME ORDER

```
1000 DATA METRIC ABBREVIATIONS
1001 DATA METER, ,KILOMETER, ,CENTIMETER, ,MILLIMETER,
1002 DATA DEKAMETER, ,DECIMETER, ,HECTOMETER, ,100 CM,
1003 DATA M, ,KM, ,CM, ,MM,
1004 DATA DAM, ,DM, ,HM, ,10 DM,
```

```
1000 DATA  METRIC EQUIVALENTS (LINEAR-HARDER)
1001 DATA  6 HM, ,  9 CM, ,  120DM, ,  50 KM,
1002 DATA  5 M, ,  7HM, ,  25 M, ,  320 CM,
1003 DATA  600 M, ,  90 MM, ,  12 M, , 50,000 M,
1004 DATA  5000 MM, , 70 DAM, ,2500 CM, , 3.2 M,
```

METER CONCENTRATION

Worksheet I

Match Column A with Column B. Use each only once.

COLUMN A

________ 1. kilo

________ 2. centi

________ 3. gram

________ 4. hecto

________ 5. liter

________ 6. milli

________ 7. deka

________ 8. meter

________ 9. deci

________ 10. base unit

COLUMN B

a. 10
b. mass/weight
c. 1
d. .1
e. length
f. 1000
g. .001
h. capacity
i. 100
j. .01

Complete the following.

1. 20 hm = ______ km
______ dam
______ m
______ dm
______ cm
______ mm

2. 84 m = ______ km
______ hm
______ dam
______ dm
______ cm
______ mm

3. 600 cm = ______ km
______ hm
______ dam
______ m
______ dm
______ mm

4. .09 km = ______ hm
______ dam
______ m
______ dm
______ cm
______ mm

METER CONCENTRATION

Worksheet II

Change the following to the form indicated.

1. 42 km = __________ hm
2. 7.1 cm = __________ mm
3. .092 hm = __________ m
4. 120 m = __________ cm
5. 10.4 dam = __________ hm
6. 78 mm = __________ cm
7. 100 dm = __________ mm
8. 9 mm = __________ km
9. 4.71 dam = __________ m
10. 8200 m = __________ dam
11. .390 dm = __________ mm
12. 721 cm = __________ m
13. 82 km = __________ m
14. .081 hm = __________ km
15. 19000 dam = __________ km
16. 3.82 m = __________ cm
17. 7.9 km = __________ mm
18. 3480 mm = __________ cm
19. 8221 dam = __________ dm
20. 97 dm = __________ dam

I. PROGRAM TITLE - "Metric Measure - Volume"

II. PROGRAM DESCRIPTION
  A. Students will view tutorial section (refer to Peer Tutoring Reference Guide).
  B. Students will match objects with their approximate measures.
  C. Students will make metric conversions from larger quantities to smaller quantities and the reverse.
  D. General section uses data lines.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
  A. Peer Tutoring Reference Guide
  B. Worksheets
    1. Objects and Their Approximate Volume
    2. Conversions Within the Metric System
  C. Application Word Problems
  D. Additional Sources
    1. Edwin I. Stein, Refresher Mathematics (Boston: Allyn and Bacon, 1980), p. 296.
    2. Sadie C. Bragg et al., General Mathematics: Skills and Applications (Morristown, New Jersey: Silver Burdett, 1979), pp. 211-213.
    3. Francis G. Lankford, Consumer Mathematics (Boston: Allyn and Bacon, 1981), pp. 132-133.

V. SKILLS NEEDED
Reading and using place value charts; multiplication and division of decimals and whole numbers.

```
1 DIMA$(10),B$(10),C$(10),D$(10),E$(10),F$(10),G$(10),H$(10),I$(15
),J$(15),K$(15),L$(15),S$(21)
5 CLS:PRINT@384," ";:INPUT "PLEASE TYPE IN YOUR NAME";A$
9 '**********************************************************
10 REM ********* METRIC LESSON - CAPACITY - LITER *********
20 '**** WRITTEN BY J.DALY, M.MCALISTER, M. MCNEARNEY ******
21 REM ****** FOR COMPUTER ASSISTED VOC. MATH ****************
22 '*********************************************************
25 CLS
27 PRINT CHR$(23)
29 C$="METRIC CAPACITY"
30 PRINT@400,C$
31 FOR N=1TO2000:NEXT
32 PRINT@640,A$", DO YOU WISH TO REVIEW ";:INPUTB$:CLS:IF B$="NO"
OR B$="N" GOTO 1000
35 CLS:PRINT@135,A$ ", SAY HI TO THE LITER!!!!";:GOSUB 100:Q=1
40 FOR N=1 TO1500:NEXT:PRINT@704,"THE LITER IS THE STANDARD UNIT O
F CAPACITY IN THE METRIC SYSTEM.":FORN=1TO2000:NEXT
47 GOSUB6000:CLS:PRINT@64, "THE LITER IS A LITTLE LARGER THAN THE
QUART IS IN OUR SYSTEM.":GOSUB200
49 FORN=1TO1500:NEXT:PRINT@714,"NOTICE HOW THE QUART IS LESS THAN
THE LITER!":FORN=1TO1500:NEXT
100 FOR X=20 TO40: SET (X,10):SET (X,25):NEXT
105 FOR Y=10 TO 25:SET(20,Y):SET(40,Y):NEXT
125 FOR Y=25 TO 10 STEP -1:FOR X=20 TO 40:SET (X,Y):NEXT X:NEXT Y
130 FOR Y=15 TO 20:FOR X=50 TO 51:SET(X,Y):NEXT X:NEXT Y
132 FOR Y=15 TO 20: FOR X=58 TO 60:SET(X,Y):NEXT:NEXT:SET(61,20):S
ET(62,20):SET(63,20):SET(64,20)
134 FOR Y=15 TO 20: FOR X=67 TO 69:SET(X,Y):NEXT :NEXT
136  FOR X=73 TO 81:SET(X,15):NEXT
138 FOR Y=15 TO 20:SET(78,Y):SET(77,Y):NEXT
140 FOR X=84 TO 92: SET(X,15):SET(X,17):SET(X,20):NEXT
142 FOR Y=15 TO 20:SET(84,Y):SET(85,Y):NEXT
144 FOR X=96 TO 104:SET(X,15):SET(X,17):NEXT
146 FOR Y=15 TO20:SET(96,Y):SET(97,Y):NEXT:SET(103,16):SET(104,16)
147 SET(98,18):SET(99,18):SET(100,19):SET(101,19):SET(102,20):SET(
103,20):SET(104,20):IF Q=1 GOTO300 ELSE RETURN
200 FOR X=20 TO40:SET(X,10):SET(X,25):NEXT:FOR Y=10TO25:SET(20,Y):
SET(40,Y):NEXT
205 FOR Y=25 TO12 STEP-1:FOR X=20 TO40 :SET(X,Y):NEXTX:NEXTY
208 FOR Y=15 TO20:SET(50,Y):SET(51,Y):NEXT:RETURN
300 GOSUB6000
305 CLS:PRINT:PRINT "THE BEST WAY TO LEARN THE METRIC SYSTEM IS TO
 THINK OF THE      CAPACITY OF FAMILIAR ITEMS IN TERMS OF LITERS R
ATHER THAN       MEMORIZING SOME COMPLICATED CONVERSION FORMULA."
307 FOR N=1TO2000:NEXT:PRINT:PRINT"FOR EXAMPLE, A 2 LITER BOTTLE O
F COLA IS SIMILAR TO A 1/2       GALLON SIZE."
309 FORN=1TO2000:NEXT:PRINT:PRINT"OF COURSE, YOU MUST KNOW THE REL
ATIONSHIPS BETWEEN THE METRIC   CAPACITIES.  YOU MIGHT WANT TO COP
Y THE FOLLOWING."
310 GOSUB6000:CLS
312 PRINT:PRINT"                    KILOLITER     (KL)   = 1000 L"
```

```
314 PRINT:PRINT"                    HECTOLITER     (
HL)   =  100 L"
316 PRINT:PRINT"                    DEKALITER      (DAL)  =   10 L"
318 PRINT:PRINT"                    LITER          (L)    "
320 PRINT:PRINT"                    DECILITER      (DL)   =  1/10 L"
322 PRINT:PRINT"                    CENTILITER     (CL)   = 1/100 L"
324 PRINT:PRINT"                    MILLILITER     (ML)   = 1/1000 L"
950 GOSUB6000
1000 DATA  WATER IN A FISH TANK,17 L,A BARREL OF OIL, 200 L,A SPOO
NFUL OF TEA, 5 ML, A SMALL CAN OF JUICE, 175 ML, ONE SERVING OF MI
LK, 300 ML, WATER FOR A SWIMMING POOL, 7 KL, A PAIL OF WATER, 8 L
1005 DATA AN APPLICATION OF EYE DROPS, 4 ML, A CAN OF SODA, 360 ML
, PUNCH FOR A BIG PARTY, 50 L
1020 PRINT"*******           SECTION 1               ********"
1050 FOR N=1 TO 10:READ A$(N), B$(N):NEXT
1060 FOR N=1TO10
1065    X =RND(10)
1070    IF A$(X)="0" GOTO 1065
1075    C$(N) = A$(X): D$(N) = B$(X)
1080    A$(X)="0"
1090 NEXT
1100 CLS
1110 FOR N=1TO10
1115 PRINT@180, "PROB. # " N
1120   PRINT@128, "FROM THE LIST ON THE RIGHT, CHOOSE";
1130   PRINT@192, "THE MOST REASONABLE MEASUREMENT";
1140   PRINT@256, "OF THE VOLUME FOR ";
1150   PRINT@320, C$(N);
1160 FOR P=1TO10
1170   PRINT@(170 +64*(P-1)),B$(P);:NEXT
1175 FOR M=1TO100:                                     PRINT@320,"
                               ";:PRINT@320,C$(N);:NEXT
1180   PRINT@704," ";:INPUT "YOUR CHOICE IS";K$
1190 IF K$=D$(N) THEN PRINT@832,A$", THAT IS CORRECT!!!":C=C+1 :EL
SE PRINT@832,A$", TOO BAD. tHE CORRECT ANSWER IS ";D$(N)
1200 GOSUB6000
1210 CLS:NEXT
1220 CLS:GOSUB 7000
1230 GOSUB6000
1250 CLS
1500 DATA WATER TO FILL A BATH TUB, L, A KEG OF BIRCH BEER SODA, L
, A SPOONFUL OF SUGAR, ML, THE JUICE FROM ONE LEMON, ML, PAINT FOR
 A HOUSE, L, MILK FOR A CAT, ML, OIL IN AN OIL DELIVERY TRUCK,KL
1510 DATA A DISH OF ICE CREAM, ML, A CUP OF COFFEE, ML,WATER FOR A
 LARGE SWIMMING POOL, KL
1520 FOR N=1TO 10
1530    READ E$(N),F$(N)
1540 NEXT
1550 FOR N=1TO10
1560   X=RND(10)
1570   IF E$(X)="0"GOTO 1560
1580   G$(N)=E$(X):H$(N)=F$(X)
1590   E$(X)="0"
1600 NEXT
```

```
1610 FOR N=1TO 10
1620 PRINT@180, "PROB. # "N
1630    PRINT@128, "FROM THE LIST ON THE RIGHT, CHOOSE";
1640   PRINT@192, "THE MOST REASONABLE UNIT OF MEASURE";
1650   PRINT@256, "OF THE VOLUME FOR";
1660   PRINT@320, G$(N);
1670   FOR P=1TO10
1680     PRINT@ (170+64*(P-1)), F$(P);:NEXT
1690 FOR R=1TO100:PRINT@320,"                                        ";:
PRINT@320, G$(N);:NEXT
1700 PRINT@704," ";:INPUT "YOUR CHOICE IS ";K$
1710 IF K$=H$(N) THEN PRINT@832, A$ ", THAT WAS SUPER!!!":C=C+1:EL
SE PRINT@832, "SORRY, "A$", THE CORRECT ANSWER IS "H$(N)
1720 GOSUB 6000
1730 CLS:NEXT
1740 GOSUB 7000
1750 GOSUB6000
1760 CLS
1800 DATA 5000 M L =     1,5, 2297 M L =    L,2.297, 77 L =    ML,
 77000,.068 K L =    L,68,162 L =    ML,162000
1810 DATA 9.2 K L =    L,9200,17 L =    K L,.017,90000 M L =    L,
90,100 L =    KL,.1,.75 L =    M L, 750
1820 DATA 45 D L =    CL,450, 3000 M L =    DAL,.3, 2 H L =    D
 L,2000,4200 C L =    L, 42, 67 D A L =    K L, .67
1830 FOR N=1 TO 15
1835 READ I$(N),J$(N)
1840 NEXT
1850 FOR N=1 TO 15
1860    X=RND(15)
1870 IF I$(N)="0" GOTO 1860
1880 K$(N)=I$(N):L$(N)=J$(N)
1890 I$(N)="0"
1900 NEXT
1910 FOR N=1 TO 15
1915      PRINT @ 180, "PROB. # "N
1920      PRINT @256, "PLEASE INDICATE THE NUMERICAL VALUE FOR EACH
"
1925 PRINT @448, K$(N)
1930      PRINT @ 704," ";:INPUT "YOUR ANSWER IS";K$
1940     IF K$=L$(N) THEN PRINT @ 832, A$ ", THAT IS CORRECT":C=C+1
:ELSE PRINT @832, "SORRY, THE CORRECT ANSWER IS "L$(N)
1950   GOSUB 6000
1960   CLS:NEXT
1970  PRINT @ 448, A$,"YOUR SCORE FOR THIS SECTION IS "(C/15)*100
" % "
1980 GOSUB 6000
1990 CLS:GOTO4000
1995 END
```

```
4000 CLS
4010 PRINT@30,"MENU"
4020 PRINT@275,"1";TAB(25)"AUTOMOTIVE"
4030 PRINT@339,"2";TAB(25)"BEAUTY CULTURE"
4040 PRINT@403,"3";TAB(25)"CLIMATE CONTROL"
4050 PRINT@467,"4";TAB(25)"ELECTRICAL"
4060 PRINT@531,"5";TAB(25)"MED. DENT. TECH."
4070 PRINT@595,"6";TAB(25)"REC. VEHICLES"
4080 PRINT@659,"7";TAB(25)"BUILDING TRADES"
4090 PRINT@840,;:INPUT"ENTER THE NUMBER OF YOUR VOCATIONAL FIELD";
Q
4095 CLS:GOTO9500
6000 PRINT@960, "PRESS C TO CONTINUE"
6001 K$=INKEY$:IF K$ ="C" RETURN ELSE 6001
7000 PRINT@448, A$ ", YOUR SCORE FOR THIS SECTION IS " (C/10)*100
" %":C=0
7001 RETURN
9500 C=0:FOR N=1TO21:READ S$(N):NEXT
9505 PRINT @180,"PROB #1"
9510 PRINT@256,S$(Q) "  WOULD MOST LIKELY COME IN "STRING$(6,CHR$(
95))" CONTAINERS"
9511 PRINT@347, "MILLILITER":PRINT@411,"LITER":PRINT@475,"KILOLITE
R"
9512 PRINT@608,;:INPUTS1$
9515 IF S1$="LITERS" OR S1$="L"OR S1$="LITER" THEN PRINT @720,"THA
T'S CORRECT, "A$:C=C+1:ELSE PRINT @720,"SORRY, "A$", THE CORRECT A
NSWER IS LITERS."
9517 GOSUB6000
9519 CLS:PRINT@180,"PROB #2"
9520 PRINT@256,S$(Q+7)"  WOULD MOST LIKELY BE FILLED WITH"
9521 PRINT@347,"MILLILITERS":PRINT@411,"LITERS":PRINT@475,"KILOLIT
ERS"
9522 PRINT@608,;:INPUTS1$
9525 IF S1$="KILOLITERS"OR S1$="KILOLITER" PRINT @720,"THAT'S CORR
ECT, "A$:C=C+1:ELSE PRINT@720,"SORRY, "A$", THE CORRECT ANSWER IS
KILOLITERS"
9527 GOSUB 6000
9530 CLS:PRINT@180,"PROB #3"
9531 PRINT@256,"A "S$(Q+14) " WOULD MOST LIKELY BE MEASURED IN"
9532 PRINT@347,"MILLILITERS":PRINT@411,"LITERS":PRINT@475,"KILOLIT
ERS"
9535 PRINT@608,;:INPUT S1$
9537 IF S1$="LITERS" OR S1$="LITER" THEN PRINT @720,"THAT'S CORREC
T, "A$:C=C+1:ELSE PRINT @720,"SORRY, "A$", THE CORRECT ANSWER IS L
ITERS"
9540 GOSUB6000
9542 CLS:PRINT@512, A$", YOUR SCORE FOR THIS SECTION IS "(C/3)*100
"%. GOODBYE, AND HAVE A NICE DAY."
9550 GOTO9550
10000 DATA CANS OF OIL, LARGE BOTTLES OF SHAMPOO, LARGE CANS OF CO
OLANT, CANS OF OIL, LARGE BOTTLEs OF ALCHOHOL, CANS OF GASOLINE, C
ANs
```

```
    10000 DATA CANS OF OIL, LARGE BOTTLES OF SHAMPOO, LARGE CANS O
F COOLANT, CANS OF OIL, LARGE BOTTLEs OF ALCHOHOL, CANS OF GASOLIN
E, CANs OF DRIVEWAY SEALER
10005 DATA GASOLINE TANKS, SEPTIC TANKS, SWIMMING POOLS, SWIMMING
POOLS,LARGE WHIRLPOOLS,GASOLINE TANKS,SILOS
10010 DATA CAN OF GREASE,LARGE BOTTLE OF CONDITIONER,LARGE CONTAIN
ER OF DRY ICE,LARGE CAN OF SOLVENT,LARGE CAN OF DISINFECTANT,LARGE
 CAN OF PAINT,LARGE CAN OF STAIN
```

METRIC MEASURE - VOLUME

Peer Tutoring Reference Guide

The basic unit of capacity in the metric system is the liter. Liters are replacing old English measures such as quarts, gallons and pints. We already can see evidence of this in the grocery store--soda is not being sold in 2 liter bottles, liquid vitamins, along with most medications, have long been sold using metric measurement.

The base unit of liquid measure, as was stated earlier, is the liter; however, often we wish to look at much larger quantities or smaller quantities and so the following prefixes are used along with the liter:

KILO	HECTO	DEKA	UNIT	DECI	CENTI	MILLI
1000	100	10	--	$\frac{1}{10}$	$\frac{1}{100}$	$\frac{1}{1000}$
				.1	.01	.001

When combining the prefix with the root, we can quite readily see that a kiloliter is 1000 liters

KILO	LITER
1000	liters

A deciliter is $\frac{1}{10}$ of a liter

A centiliter is $\frac{1}{100}$ of a liter and $\frac{1}{10}$ of a deciliter.

A milliliter is $\frac{1}{1000}$ of a liter and $\frac{1}{10}$ of a centiliter and so on.

EXAMPLE I

.8 kl = ______ cl
(kiloliter) (centiliter)

Here, we are going from a larger quantity to a smaller quantity so we multiply. Since we are moving 5 places (KILO, HECTO, DEKA, BASE, DECI, CENTI), we multiply by 100,000

.8 x 100,000 = 80,000

In other words,

.8 kl = 80,000 cl

EXAMPLE 2

54 l = ________ dal
(liters) (dekaliter)

In this problem, we are moving from a smaller quantity to a larger quantity so we must divide. Since we are moving one place we divide by 10

$$54 \div 10 = 5.4 \qquad 10\overline{)\,54.}\ \ \text{quotient } 5.4$$

Or

54 l = 5.4 dal

METRIC MEASURE - VOLUME

Worksheet I

Match Column A with Column B. Use each only once. Remember, these are only approximations.

COLUMN A

________ 1. capacity of an oil tanker

________ 2. a dosage of liquid vitamins for a 6-month old child

________ 3. amount of water in the Atlantic Ocean

________ 4. capacity of a motorcycle gas tank

________ 5. soda needed for 6 servings

________ 6. a glass of milk

________ 7. one tank of freon

________ 8. drum of roofing tar

________ 9. commercial size shampoo

________10. 1 drum of spackling compound

COLUMN B

a. 700,000,000,000 kl
b. 1 liter
c. .2 dal
d. 4 l
e. .4 dal
f. 600 kl
g. 20 l
h. 1 dal
i. 50,000 kl
j. 2 dl

METRIC MEASURE - VOLUME

Worksheet II

Converting metric units (liquid)

1. 67 kl = ________ l
2. 8.6 dal = ________ dl
3. 97 l = ________ cl
4. .008 kl = ________ ml
5. 74 l = ________ hl
6. 900 dal = ________ ml
7. .07 kl = ________ cl
8. 49 ml = ________ cl
9. 2800 ml = ________ l
10. .72 kl = ________ hl
11. 380,000 ml = ________ kl
12. 7.3 cl = ________ ml
13. 55 l = ________ dal
14. 2.8 kl = ________ l
15. .92 hl = ________ cl
16. .88 dal = ________ dl
17. 280 dl = ________ l
18. .049 l = ________ cl
19. 72 cl = ________ ml
20. 100 l = ________ cl

METRIC MEASURE - VOLUME

Application Problems

1. If a drum of mastic holds 19 l, then it holds

________ kl

________ hl

________ dal

________ dl

________ cl

________ ml

2. If a bottle of hair color holds 4 dl, then it holds

________ kl

________ hl

________ dal

________ l

________ cl

________ ml

3. If a tank of freon holds .5 dal, then it holds

________ kl

________ hl

________ l

________ dl

________ cl

________ ml

Application Problems

4. If a gas tank holds 80 liters, then it holds

________ kl

________ hl

________ dal

________ dl

________ cl

________ ml

5. If a medicine bottle holds 5 cl, then it holds

________ kl

________ hl

________ dal

________ l

________ dl

________ ml

6. If a septic tank holds .6 kl, then it holds

________ hl

________ dal

________ l

________ dl

________ cl

________ ml

I. PROGRAM TITLE - "Liter Concentration"

II. PROGRAM DESCRIPTION
  A. Students will match metric equivalents using the liter for its base.
  B. Data lines are used throughout.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
  A. Peer Tutoring Reference Guide (see No. 15 - Liter)
  B. Worksheets
    1. Problems
    2. Additional Problems
  C. Additional Sources
    1. Edwin I. Stein, Refresher Mathematics (Boston: Allyn and Bacon, 1980), p. 296.
    2. Sadie C. Bragg et al., General Mathematics: Skills and Applications (Morristown, New Jersey: Silver Burdett, 1979), pp. 211-213.
    3. Francis G. Lankford, Consumer Mathematics (Boston: Allyn and Bacon, 1981), pp. 132-122.

V. SKILLS NEEDED
Reading and using place value charts; multiplication and division of decimals and whole numbers.

LITER CONCENTRATION

THESE LINES ARE PART OF THE CONCENTRATION PROGRAM # 16

THE MAIN PROGRAM LISTING CAN BE FOUND IN PROGRAM # 10

IF YOU WISH, YOU MAY MAKE UP YOUR OWN DATA AND REPLACE LINES 1000-1004 IN THE SAME ORDER

```
1000 DATA METRIC EQUIVALENTS (CAPACITY)
1001 DATA 2430DL, ,.91DAL, ,3.2L, ,635CL,
1002 DATA 2.51KL, ,8967ML, ,24HL, ,745DL,
1003 DATA 24.30DAL, ,9100ML, ,320CL, ,.0635HL,
1004 DATA 251000CL, ,.008967KL, ,24000DL, ,74.5L,
```

```
1000 DATA METRIC EQUIVALENTS (CAPACITY)
1001 DATA 1ML, ,1CL, ,3KL, ,4HL,
1002 DATA 5 ML, ,1 KL, ,1 L, ,2L,
1003 DATA .001 L, ,.01 L, ,3000 L, ,400 L,
1004 DATA .005 L, ,1000 L, ,1000 ML, ,20 DL,
```

LITER CONCENTRATION

Worksheet I

A. Match Column A with Column B. Use each only once.

COLUMN A

________ 1. centi

________ 2. hecto

________ 3. kilo

________ 4. gram

________ 5. base unit

________ 6. deci

________ 7. meter

________ 8. deka

________ 9. liter

________ 10. milli

COLUMN B

a. 100
b. .01
c. 10
d. volume
e. mass/weight
f. 1
g. capacity
h. 1000
i. .1
j. .001

B. Complete:

1. 800 l =

________ kl

________ hl

________ dal

________ dl

________ cl

________ ml

2. .7 kl =

________ hl

________ dal

________ l

________ dl

________ cl

________ ml

LITER CONCENTRATION

Worksheet II

Change each of the following to the form indicated.

1. 45 kl = ________ hl

2. 9.2 cl = ________ ml

3. .87 hl = ________ l

4. 820 l = ________ cl

5. 97 dal = ________ hl

6. 230 ml = ________ cl

7. 612 dl = ________ ml

8. 300 ml = ________ kl

9. 976 dal = ________ dl

10. .198 l = ________ ml

11. 200 dl = ________ l

12. 4.8 cl = ________ hl

13. .16 kl = ________ dal

14. 8.2 hl = ________ l

15. 300 dal = ________ ml

16. .490 l = ________ cl

17. .008 kl = ________ ml

18. 720 ml = ________ cl

19. 89 dal = ________ dl

20. 640 dl = ________ dal

Worksheet I, Continued

3. 920 hl =

________ kl

________ dal

________ l

________ dl

________ cl

________ ml

4. 8.6 dal =

________ kl

________ hl

________ l

________ dl

________ cl

________ ml

I. PROGRAM TITLE - "Metric Measure - Mass or Weight"

II. PROGRAM DESCRIPTION
   A. Students will view tutorial section (refer to Peer Tutoring Reference Guide)
   B. Students will match objects with their approximate weights.
   C. Students will make metric conversions from larger quantities to smaller quantities and vice versa.
   D. General section uses data lines.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide
   B. Worksheets
      1. Objects and Their Approximate Weight
      2. Conversions Within the Metric System
   C. Application Word Problems
   D. Additional Sources
      1. Edwin I. Stein, Refresher Mathematics (Boston: Allyn and Bacon, 1980), pp. 288-302.
      2. Sadie C. Bragg et al., General Mathematics (Morristown, New Jersey: Silver Burdett, 1979), pp. 208-210.
      3. Francis G. Lankford, Consumer Mathematics (Boston: Allyn and Bacon, 1981), pp. 130-131.

V. SKILLS NEEDED
Reading and using place value charts, multiplication and division of whole numbers and decimals.

```
1 '************************************************************
3 '*********** METRIC LESSON MASS-GRAM   *******************
4 '***********     WRITTEN BY           ******************
5 '*********** J.DALY,M.MCALISTER,M.MCNEARNEY **************
6 '*********** FOR COMP. ASS'T VOC MATH    *****************
7 '***********          DEC. 1980        ******************
8 '**********************************************************
9 CLEAR 500: DIM I$(15),J$(15),K$(15),L$(15),S$(21)
100 CLS:PRINT @512, "GOOD MORNING, WHAT IS YOUR NAME";:INPUTA$
102 CLS:PRINT@512,"TODAY'S LESSON WILL BE ON THE GRAM. DO YOU WISH
 TO REVIEW";:INPUT A1$
103 IF A1$="Y" OR A1$="YES" CLS:GOSUB 8000:CLS:PRINT@512,"DO YOU W
ISH TO REVIEW AGAIN";:INPUTA1$:IF A1$="Y"OR A1$="YES" GOTO 103
970 CLS:PRINT@468,"  *****  SECTION  1  *****  "
980 FOR N=1 TO 1500:NEXT:CLS
1000 DATA MEDIUM SIZE DOG,8 KG,CAN OF BEANS, 453 G,NO. 2 PENCIL,5
G, PAPER CLIP, 515 MG, WOMAN,50 KG
1005 DATA LION,170 KG,SEWING NEEDLE,380 MG, BOWLING BALL, 7 KG,A V
ITAMIN PILL, 250 MG,WEIGHT OF 1 PR. OF MEN'S SHOES,1 KG
1050 FOR N=1TO10:READA$(N),B$(N):NEXT
1060 FOR N=1TO10
1070   X=RND(10)
1080   IF A$(X)="0" THEN GOTO 1070
1085  C$(N) = A$(X):D$(N) = B$(X)
1090  A$(X)="0"
1100 NEXT
1110 CLS
1120 FOR N=1TO10
1125 PRINT@180, "PROB.# " N
1130 PRINT@128,"FROM THE LIST ON THE RIGHT, CHOOSE";
1135 PRINT@192, "tHE MOST REASONABLE MEASUREMENT";
1140 PRINT@256,"FOR THE WEIGHT OF A ";
1150 PRINT@320, C$(N);
1160 FOR P=1TO10
1170  PRINT@(170+64*(P-1)),B$(P);:NEXT
1175 FOR M=1 TO100:                             PRINT@320,"
                    ";:PRINT@320,C$(N);:NEXT
1180 PRINT@704, " ";:INPUT "YOUR CHOICE IS";K$
1190 IF VAL(K$)=VAL(D$(N)) THEN PRINT@832,A$", tHAT IS CORRECT!!!"
:C=C+1:ELSE PRINT@832, A$", TOO BAD, THE CORRECT ANSWER IS ";D$(N)
1200 GOSUB 6000
1210 CLS: NEXT
1220 CLS: GOSUB 7000
1230 GOSUB 6000
1240 CLS
1250 PRINT@468, " *****  SECTION  2  ***** "
1260 FOR N=1 TO1000: NEXT:CLS
1270 DATA A LOAF OF BREAD, G, AN EYELASH, MG, A CAR ENGINE,KG,A MI
NIBIKE,KG,GOLD CHAIN,G
```

```
1275 DATA WIRE FILAMENT, MG, ONE SERVING OF MEAT,G,ONE AIR CONDITI
ONER,KG, SHEET OF PAPER, MG, AN EGG,G
1280 FOR N=1TO10
1290   READ E$(N),F$(N)
1300 NEXT
1310 FOR N=1TO 10
1320   X=RND(10)
1330   IF E$(X)="0" THEN 1320
1340   G$(N) = E$(X): H$(N) =F$(X)
1350   E$(X) = "0"
1360 NEXT
1370 FOR N=1 TO 10
1380   PRINT@180, "PROB. # "N
1390   PRINT@128, "FROM THE LIST ON THE RIGHT, CHOOSE ";
1400   PRINT@192, "THE MOST REASONABLE UNIT OF MEASURE";
1410   PRINT@256, "OF THE WEIGHT FOR";
1420   PRINT@320, G$(N);
1430   FOR P = 1 TO 10
1440     PRINT@(170+64*(P-1)), F$(P);
1443   NEXT
1450   FOR R = 1 TO 100:PRINT@320,"
        ";:PRINT@320,G$(N);
1460 NEXT
1470 PRINT@704," ";:INPUT "YOUR CHOICE IS ";K$
1480 IF K$ = H$(N) THEN PRINT@832,A$ ", KEEP UP THE GOOD WORK!!!":
C=C+1:ELSE PRINT@832,"TOO BAD, "A$", THE ANSWER WAS "H$(N)
1490 GOSUB 6000
1500 CLS: NEXT
1510 GOSUB 7000
1520 GOSUB 6000
1524 CLS:PRINT@468, " *****  SECTION 3  *****"
1525 FOR N=1 TO 1500:NEXT
1530 CLS
1540 DATA 3718 MG =       G,3.718,7.8 G =       KG,.0078,0.42 G =
       MG,420,60000 G =       KG,60,2.3 KG =         G,2300,137 M
G =        G,.137
1545 DATA 0.36 KG =        G,360, 0.24 G =       MG,240,1.7 KG =
     G,1700,250 G =      KG,.25,500 G =       KG,.5
1550 DATA 38 KG =         G,38000,715 G =        KG,.715, O.4 KG =
       G,400,67.2 G =          KG,.0672
1560 FOR N=1 TO 15
1570   READ I$(N),J$(N)
1580 NEXT
1590 FOR N = 1 TO 15
1600   X = RND(15)
1610   IF I$(N) = "0" THEN 1600
1620   K$(N) = I$(N): L$(N) = J$(N)
1630   I$(N) = "0"
1640 NEXT
1645 C=0
1650 FOR N=1 TO 15
1660    PRINT@180, "PROB. # " N
1670    PRINT@256, " PLEASE INDICATE THE NUMERICAL VALUE FOR EACH"
```

```
1680 PRINT@468, K$(N)
1690 PRINT@704, " ";:INPUT "YOUR ANSWER IS ";K$
1700 IF VAL(K$) = VAL(L$(N)) THEN PRINT@832, A$ ", YOU KNOW YOUR M
ETRICS!":C=C+1:ELSE PRINT@832,"SORRY, THE CORRECT ANSWER IS " L$(N
)
1710 GOSUB 6000
1720 CLS:NEXT
1730 PRINT@448, A$ ", YOUR SCORE FOR THIS SECTION IS "(C/15)*100 "
 %"
1740 GOSUB 6000
1750 CLS:GOTO4000
4000 CLS
4010 PRINT@30,"MENU"
4020 PRINT@275,"1";TAB(25);"AUTOMOTIVE"
4030 PRINT@339,"2";TAB(25);"BEAUTY CULTURE"
4040 PRINT@403,"3";TAB(25);"CLIMATE CONTROL"
4050 PRINT @467,"4";TAB(25);"ELECTRICAL"
4060 PRINT @531,"5";TAB(25);"MED. DENT. TECH."
4070 PRINT @595,"6";TAB(25);"REC. VEHICLES"
4080 PRINT @659,"7";TAB(25);"BUILDING TRADES"
4090 PRINT @840,;:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FIELD
";Q
4095 CLS:GOTO9500
6000 PRINT@896, "PRESS C TO CONTINUE"
6001 K$ = INKEY$:IF K$ = "C" THEN RETURN ELSE 6001
7000 CLS:PRINT@448, A$", YOUR SCORE FOR THIS SECTION IS "(C/10)*10
0 " %":C=0
7001 RETURN
8000 CLS:PRINT@409, "454 GRAMS"
8050 FOR X=10 TO 124 STEP2: FOR Y=2TO16 STEP2:SET(X,Y):NEXT Y:NEXT
 X
8051 RESET(10,14):RESET(10,16):RESET(122,14):RESET(124,14):RESET(1
22,16):RESET(124,16)
8052 Z=43:K=78:Y=24:FORN=1TO14:FOR X=ZTOK:SET(X,Y):NEXT:Z=Z-1:K=K+
1:Y=Y+1:NEXT
8060 PRINT @852,"EQUALS ONE POUND (LB)";
8065 GOSUB6000
8067 CLS: PRINT"                    PRESS SPACE BAR TO CONTINUE"
8069 PRINT:PRINT"      AS YOU CAN SEE, A GRAM IS A VERY SMALL WEIGH
T."
8070 GOSUB 9000
8072 PRINT:PRINT"THEREFORE, UNLESS WE ARE WORKING WITH VERY SMALL
QUANTITIES WE  USUALLY USE KILOGRAMS."
8074 GOSUB9000
8076 PRINT:PRINT"REMEMBER, KILO MEANS THOUSAND, SO, 1000 GRAMS OR
A KILOGRAM WILL EQUAL SLIGHTLY MORE THAN 2 LBS."
8078 GOSUB9000
8080 PRINT:PRINT"FOR EXAMPLE, A SMALL PERSON MIGHT WEIGH 50 KILOGR
AMS."
8081 PRINT"A BOWLING BALL MIGHT WEIGH 7 KILOGRAMS."
8082 GOSUB9000
8084 PRINT:PRINT"THE BEST WAY TO LEARN THE METRIC SYSTEM IS TO THI
NK OF THE       WEIGHT OF FAMILAR ITEMS IN TERMS OF GRAMS OR KILOGR
AMS RATHER   THAN MEMORIZING SOME COMPLICATED CONVERSION FORMULA."
```

```
8086 GOSUB9000
8090 CLS:PRINT"OF COURSE,  YOU MUST KNOW THE RELATIONSHIP BETWEEN
THE METRIC    WEIGHTS. YOU MIGHT WANT TO COPY THE FOLLOWING:
8092 GOSUB9000
8094 PRINT:PRINT "                KILOGRAM   (KG) = 1000 G
8096 PRINT:PRINT "                HECTOGRAM  (HG) =  100 G
8098 PRINT:PRINT "                DEKAGRAM  (DAG) =  10 G
8100 PRINT:PRINT "                GRAM       (G)
8102 PRINT:PRINT "                DECIGRAM   (DG)  =  1/10  G
8104 PRINT:PRINT "                CENTIGRAM  (CG)  =  1/100  G
8106 PRINT:PRINT "                MILLIGRAM  (MG)  =  1/1000 G
8110 GOSUB9000
8112 RETURN
9000 Q$=INKEY$:IFQ$=" " RETURN ELSE 9000
9010 GOTO9010
9500 C=0:FOR N=1TO21:READ S$(N):NEXT
9505 PRINT @180,"PROBLEM #1"
9510 PRINT@256, S$(Q) " WOULD MOST LIKELY HAVE THEIR WEIGHT MEASUR
ED IN"
9511 PRINT @347,"MILLIGRAMS":PRINT@411,"GRAMS":PRINT@475,"KILOGRAM
S"
9512 PRINT @608,;:INPUTS1$
9515  IF  S1$="GRAMS" PRINT @720, "THAT'S CORRECT, "A$:C=C+1:ELSE
PRINT @720, "SORRY, "A$", THE CORRECT ANSWER IS GRAMS."
9517 GOSUB6000
9519 CLS: PRINT @180,"PROBLEM #2"
9520 PRINT @256, S$(Q+7) " WOULD MOST LIKELY HAVE THEIR WEIGHT MEA
SURED IN"
9521 PRINT @347,"MILLIGRAMS":PRINT@411,"GRAMS":PRINT@475,"KILOGRAM
S"
9522 PRINT@608,;:INPUT S1$
9525 IF S1$="KILOGRAMS" PRINT @720, "THAT'S CORRECT, "A$:C=C+1:ELS
E PRINT@720,"SORRY, "A$", THE CORRECT ANSWER IS KILOGRAMS."
9527 GOSUB6000
9530 CLS:PRINT@180,"PROBLEM #3"
9531 PRINT@256, "A CASE OF "S$(Q+14)" WOULD MOST LIKELY BE WEIGHED
 IN"
9532 PRINT@347,"MILLIGRAMS":PRINT@411,"GRAMS":PRINT@475,"KILOGRAMS
"

9535 PRINT@608,;:INPUTS1$
9537 IF S1$="KILOGRAMS" THEN PRINT@720,"THAT'S CORRECT, "A$:C=C+1:
ELSE PRINT@720, "SORRY, "A$", THE CORRECT ANSWER IS KILOGRAMS"
9540 GOSUB6000
9542 CLS: PRINT @512, A$", YOUR SCORE FOR THIS SECTION IS "(C/3)*1
00"%."
9543 PRINT@576, "GOODBYE, "A$".     HAVE A NICE DAY!!!"
9550 GOTO 9550
10000 DATA SCREWS, HAIR CLIPS, SMALL CLAMPS, SMALL SWITCHES, SYRIN
GES,NUTS,NAILS
10002 DATA TIRES, HAIR DRYERS, CANS OF COOLANT, CAR BATTERIES, SCA
LES, HEADLIGHTS, 2 BY 4'S
10004 DATA OIL,SHAMPOO, ANTIFREEZE, SWITCHES,ASPERIN,OIL,NAILS
```

METRIC MEASURE -- MASS AND WEIGHT

Peer Tutoring Reference Guide

We have used various objects for weighing over the centuries. Stones, grain and shells are just a few. These, however, were replaced with other measures. Here, in the United States, we used the ounce, the pound and the ton. This is changing again. In order to have a uniformed language of measure, the world is going metric.

The gram (g) is the basic unit of measurement used in the metric system for weight. But you might ask, what weighs a gram? One example could be a raisin:

1 raisin $\doteq$ 1 gram (g)

equals
approx.

There are many objects that are much heavier and lighter than raisins and in order to weigh such objects, the following prefixes are used:

KILI = 1000 HECTO = 100 DEKA = 10 UNIT DECI = $\frac{1}{10}$

CENTI = $\frac{1}{100}$ MILLI = $\frac{1}{1000}$

For example, a kilogram (kg)

If we look at the word kilogram, we can break it down into

KILO	GRAM
1000	grams

So kilogram means 1000 grams.

The average textbook weighs approximately 1 kilogram (kg). So a kilogram is just a little more than 2 pounds.

On the other end of the spectrum, we sometimes will need to measure objects of little mass. Most prescriptions indicate that the medications be used in very small quantities, and so the milligram (mg) is used. Milligram can be broken down into

MILLI	GRAM
$\frac{1}{1000}$	gram

So milligram means $\frac{1}{1000}$ gram

Medicine has been using the metric system for years.

An (1) eyelash weighs approximately 1 milligram (mg).

Now that we have an idea of what kilograms, grams and milligrams are used for, let's look at all of the prefixes and their symbols again.

KILO	HECTO	DEKA	UNIT	DECI	CENTI	MILLI
(k)	(h)	(da)		(d)	(c)	(m)

EXAMPLE I

58 kg = ________ g

Kilo = 1000
gram = base unit

Here, we are going from a larger unit to a smaller unit, so multiplication is the operation. We are moving three (3) places to the right. We must multiply by 1000.

58 x 1000 (Remember that since we see no decimal point, that it is behind the 8)

58,000

So that, 58 kg = 58,000 grams

EXAMPLE II

7.2 hg = ________ mg

In this example, we are once again going from a larger unit to a smaller unit so we must multiply. Since we are moving 5 places, we multiply by 100,000

Again, we are moving to the right on our chart. This time we are moving 5 places; since a decimal point is shown, 7.2, we simply move it 5 places to the right:

7.2 hectograms = 720,000 mg

EXAMPLE III

Sometimes we wish to go from a smaller quantity to a larger quantity

28.4 mg = _______ g

Grams, or the base unit, is 3 places to the left and so the decimal is moved to the left 3 places. In other words, divide by 1000.

28.4 mg = .0284 g

METRIC MEASURE - MASS OR WEIGHT

Worksheet I

Match Column A with Column B. Use each only once. Remember, these are only approximations.

COLUMN A

________ 1. a raisin

________ 2. a sugar-coated cornflake

________ 3. a math book

________ 4. a box of prunes

________ 5. a small grain of rice

________ 6. a dozen small bananas

________ 7. a bee's wing

________ 8. a bowling ball

________ 9. a football player

________ 10. an elephant

________ 11. a stick of butter

________ 12. a motorcycle

________ 13. an average 2 year old

________ 14. a box of thumbtacks

COLUMN B

a. 1 hectogram (hg)
b. 1 milligram (mg)
c. 92 kilograms (kg)
d. 2000 kilograms (kg)
e. 1 gram (g)
f. 7 kilograms (kg)
g. 12 kilograms (kg)
h. 1 centigram (cg)
i. 1 decigram (dg)
j. 2 dekagrams (dag)
k. 5 hectograms (hg)
l. 1 kilogram (kg)
m. 200 kilograms (kg)
n. 2 kilograms (kg)

METRIC MEASURE - MASS OR WEIGHT

Worksheet II

Converting metric units of weight.

1. 48 kg = __________ g
2. 9.7 dag = __________ dg
3. 84 g = __________ cg
4. .007 kg = __________ mg
5. 63 g = __________ dag
6. 800 g = __________ hg
7. 9.06 dag = __________ mg
8. 734,800 mg = __________ g
9. .084 kg = __________ cg
10. 400,000 mg = __________ g
11. 280,000 mg = __________ kg
12. 2.8 cg = __________ mg
13. 45 g = __________ dg
14. 9000 kg = __________ g
15. 2.8 hg = __________ cg
16. .76 dag = __________ dg
17. 180 dag = __________ mg
18. 17 g = __________ cg
19. 14 cg = __________ mg
20. 25 g = __________ cg

METRIC MEASURE - MASS OR WEIGHT

Application Word Problems

1. If a tire weighs 15 kg, then it weighs:

__________ hg

__________ dag

__________ g

__________ dg

__________ cg

__________ mg

2. If a hair tint calls for .2 grams of a certain chemical, then it would call for how many:

__________ kg

__________ hg

__________ dag

__________ g

__________ dg

__________ cg

__________ mg

Application Word Problems

3. A truck can carry 800 kg of material. This is equivalent to:

__________ hg

__________ dag

__________ g

__________ dg

__________ cg

__________ mg

4. A filling for a tooth weighs 2.4 dg. This is equivalent to:

__________ kg

__________ hg

__________ dag

__________ g

__________ dg

__________ cg

__________ mg

5. If the dosage for a certain prescription is .5 mg, complete the following:

__________ kg

__________ hg

__________ dag

__________ g

__________ dg

__________ cg

Application Word Problems

6. If a mason has 22.3 hg of concrete, this is equivalent to:

__________ kg

__________ hg

__________ dag

__________ g

__________ dg

__________ cg

__________ mg

I. PROGRAM TITLE - "Gram Concentration"

II. PROGRAM DESCRIPTION
  A. This program has four facets each of which is described below.
    1. Students will match metric units.
    2. Students will match metric equivalents (level I).
    3. Students will match metric equivalents using more difficult measures.
    4. Students will use metric prefixes and root words.

  B. Data line based.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
  A. See Peer Tutoring Reference Guide for the Gram (#17)
  B. Worksheets
    1. Prefixes and Their Meanings
    2. Equivalents
  C. Additional Sources
    1. Edwin I. Stein, Refresher Mathematics (Boston: Allyn and Bacon, 1980), pp. 288-302.
    2. Sadie C. Bragg et al., General Mathematics (Morristown, New Jersey: Silver Burdett, 1979), pp. 208-210.
    3. Francis G. Lankford, Consumer Mathematics (Boston: Allyn and Bacon, 1981), pp. 130-131.

V. SKILLS NEEDED
Reading and using place value charts, multiplication and division of whole numbers and decimals.

GRAM CONCENTRATION

THE FOLLOWING DATA LINES ARE FOR PROGRAM # 18

THESE ARE TO BE USED IN THE MAIN CONCENTRATION PROGRAM

THIS PRINTOUT CAN BE FOUND IN PROGRAM #10

```
1000 DATA METRIC MEASURE
1001 DATA G, ,MG, ,KG, ,DG,
1002 DATA CG, ,DAG, ,HG, ,1/10,
1003 DATA GRAM, ,MILLIGRAM, ,KILOGRAM, ,DECIGRAM,
1004 DATA CENTIGRAM, ,DEKAGRAM, ,HECTOGRAM, ,.1,
```

```
1000 DATA METRIC MEASURE
1001 DATA 1000G, ,100G, ,10G, ,10DG,
1002 DATA 1/100G, ,1/1000, ,2KG, ,2HG,
1003 DATA KG, ,HG, ,DAG, ,G,
1004 DATA CG, ,MG, ,2000G, ,200G,
```

OTHER VERSIONS OF THIS CAN BE WRITTEN IF YOU REPLACE LINES 1000-1004 WITH YOUR OWN DATA IN THE SAME ORDER AS IT IS NOW

GRAM CONCENTRATION

Worksheet I

Match Column A with Column B. Use each only once.

COLUMN A

________ 1. meter
________ 2. kilo
________ 3. centi
________ 4. hecto
________ 5. gram
________ 6. milli
________ 7. deci
________ 8. base unit
________ 9. liter
________10. deka

COLUMN B

a. capacity
b. 1
c. 10
d. length
e. .1
f. 1000
g. mass/weight
h. .001
i. 100
j. .01

Complete the following.

1. .08 kg = ______ hg
______ dag
______ g
______ dg
______ cg
______ mg

2. 63 g = ______ kg
______ hg
______ dag
______ dg
______ cg
______ mg

3. 700 cg = ______ kg
______ hg
______ dag
______ g
______ dg
______ mg

4. .004 hg = ______ kg
______ dag
______ g
______ dg
______ cg
______ mg

GRAM CONCENTRATION

Worksheet II

Change the following to the form indicated.

1. 7 cg = ________ hg
2. 904 kg = ________ mg
3. .63 g = ________ cg
4. 850 dag = ________ hg
5. 12 mg = ________ cg
6. 100 dg = ________ kg
7. 73,000 mg = ________ g
8. .2 dag = ________ dg
9. .111 g = ________ mg
10. 650 dg = ________ kg
11. 7.85 cg = ________ mg
12. 5400 kg = ________ g
13. .21 hg = ________ dg
14. 7.8 dag = ________ mg
15. 8.2 cg = ________ g
16. 600 g = ________ hg
17. .98 kg = ________ dag
18. 1000 mg = ________ g
19. .4 dag = ________ kg
20. 97.60 dg = ________ kg

I. PROGRAM TITLE - "Perimeter"

II. PROGRAM DESCRIPTION
   - A. Students will be guided through a tutorial lesson.
   - B. Students will define perimeter, regular polygon, circumference, etc.
   - C. Students will find the perimeter of various geometric shapes.
   - D. Students will use perimeter in various practical application problems.
   - E. Randon generation is used.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   - A. Peer Tutoring Reference Guide
   - B. Worksheet
   - C. Application Word Problems
   - D. Additional Sources
      1. Foster et al., Geometry (Columbus, Ohio: Charles E. Merrill Publishing Co., 1981), pp. 218-219.
      2. Moise, E. and F. Downs, Geometry (Menlo Park, California: Addison Wesley, 1975), pp. 535-545.

V. SKILLS NEEDED
Addition, subtraction, multiplication and division of whole numbers and decimals

```
1 '*****************     PERIMETERS    **********************
2 '*********        COMP ASS'T VOC MATH      ******************
3 '*********            WRITTEN BY                     *********
4 '*********    MC ALISTER - MC NEARNEY - DALY        *********
5 '**********************************************************
7 CLEAR200
10 CLS:PRINT@347,"PERIMETERS":FORX=45TO81:SET(X,12):SET(X,19):NEXT
X:FORY=12TO19:SET(45,Y):SET(81,Y):NEXTY
20 PRINT@640,"ENTER 'R' IF YOU WISH TO REVIEW BEFORE THE QUIZ. ENT
ER ANY OTHERLETTER TO GO DIRECTLY TO IT.":INPUTB$:IFB$<>"R" THEN 2
20
23 CLS:PRINT"     WELCOME TO THE WORLD OF PERIMETERS.  THIS PROGRA
M WILL STOPPERIODICALLY TO ALLOW YOU TO READ THE MATERIAL THAT IS
ON THE   SCREEN."
25 PRINT"HIT THE SPACEBAR WHEN YOU HAVE FINISHED READING THE MATER
IAL ANDWISH TO GO ON.  LIKE RIGHT NOW.":GOSUB5000
30 CLS: FORX=45TO81:SET(X,12):SET(X,19):NEXTX:FORY=12TO19:SET(45,Y
):SET(81,Y):NEXTY:PRINT@474,"P = 2L + 2W"
40 PRINT@512," A PERIMETER IS THE MEASURE OF LENGTH OF A SHAPE'S O
UTSIDE EDGE. THERE ARE ALMOST AS MANY WAYS TO DO THIS AS THERE ARE
 SHAPES,    BUT FOR NOW, WE WILL STICK TO A FEW BASIC ONES.":GOSUB
5000
50 PRINT@512,"FOR A RECTANGLE, YOU JUST ADD THE LENGTH AND WIDTH,
THEN DOUBLE WHAT YOU GET. FOR A SQUARE, YOU JUST MULTIPLY THE LENG
TH OF ONE SIDE BY FOUR.
60 PRINT"FOR EXAMPLE, IF YOU HAD A RECTANGLE THAT WAS 12 FEET BY 2
0, THE PERIMETER WOULD BE 12 + 20, OR 32, THEN MULTIPLY THAT BY 2,
 TO  GET 64 FEET.":GOSUB5000
70 CLS:FORX=56TO73:SET(X,12):NEXTX:Y=11:FORX=57TO64:SET(X,Y):LETY=
Y-1:NEXTX:Y=4:FORX=65TO72:SET(X,Y):Y=Y+1:NEXTX
80 PRINT@384," TRIANGLES ARE A DIFFERENT MATTER.  UNLESS IT'S EQUI
LATERAL (IN WHICH CASE YOU MERELY MULTIPLY THE LENGTH OF ONE SIDE
BY 3) YOU MUST ADD UP THE THREE SIDES TO GET THE PERIMETER.  THERE
 REALLY ISN'T A QUICK AND EASY WAY OUT."
81 GOSUB5000
90 CLS:PRINT"FOR REGULAR POLYGONS, LIKE A HEXAGON, THERE IS AN EAS
Y WAY OUT. GET THE LENGTH OF ONE SIDE AND MULTIPLY IT BY THE NUMBE
R OF     SIDES. SIMPLE ENOUGH? BUT REMEMBER, THAT'S JUST REGULAR P
OLYGONS. IRREGULAR ONES YOU HAVE TO ADD UP."
100 GOSUB5000
110 PRINT"FOR EXAMPLE, SAY YOU HAVE A REGULAR OCTAGON.":GOSUB5000
120 FORX=61TO70:SET(X,37):SET(X,46):NEXTX:FORY=40TO43:SET(55,Y):SE
T(56,Y):SET(75,Y):SET(76,Y):NEXTY:FORX=57TO58:SET(X,39):SET(X,44):
NEXTX:FORX=59TO60:SET(X,38):SET(X,45):NEXTX:FORX=71TO72:SET(X,45):
SET(X,38):NEXTX
125 FORX=73TO74:SET(X,44):SET(X,39):NEXTX:GOSUB5000
130 PRINT:PRINT"ONE OF ITS SIDES MEASURE 6 INCHES. SO ITS PERMITER
 WOULD BE:8 ( THE NUMBER OF SIDES)*6 (THE LENGTH OF ONE SIDE),OR 4
8 INCHES.GOTIT OKAY.":GOSUB5000
140 CLS:SET(64,11):SET(64,5):SET(57,6):SET(52,8):SET(50,11):SET(52
,14):SET(57,17):SET(64,17):SET(71,16):SET(76,14):SET(78,11):SET(71
,6):PRINT@474,"P2R*PI"
```

```
140 CLS:SET(64,11):SET(64,5):SET(57,6):SET(52,8):SET(50,11):SET(52
,14):SET(57,17):SET(64,17):SET(71,16):SET(76,14):SET(78,11):SET(71
,6):PRINT@474,"P2R*PI"
150 PRINT@512,"A CIRCLE IS A LITTLE DIFFERENT FROM ANYTHING ELSE,
AS FAR AS THEPERIMETER( OR CIRCUMFERENCE,  AS IT'S CALLED WITH A C
IRCLE ) IS CONCERED.":GOSUB5000
160 PRINT "FIRST YOU HAVE TO FIND THE RADIUS,":FOR Q=1 TO 12:FOR X
=51 TO 63:SET(X,11):FOR Z=1 TO 5:NEXT Z:RESET(X,11):NEXTX:NEXTQ:GO
SUB 5000
170 PRINT"WHICH YOU DOUBLE ( IN CASE YOU HAVEN'T NOTICED, THAT'S E
QUAL TO THE DIAMETER OF THE CIRCLE ).". GOSUB 5000
180 PRINT"   THEN YOU MULTIPLY THAT BY THE NUMBER PI.":GOSUB 5000
190 CLS:PRINT@512,"PI IS WHAT MATHEMATICIANS CALL A TRANSCENDENTAL
 NUMBER (NO,THAT DOES NOT MEAN THAT IT LEARNED HOW TO MEDITATE FRO
M THE MAHARISHI).  HOWEVER, FOR OUR PURPOSES, WE WILL SET PI AT A
VALUE OF 3.1416. (REMEMBER THAT! IT'S "
200 PRINT"VERY IMPORTANT---YOU'LL NEED IT LATER.)":GOSUB5000
210 CLS:INPUT "NOW FOR THE QUIZ.  IF YOU FEEL THAT YOU ARE NOT REA
DY, AND WANT TO REVIEW ONE MORE TIME,ENTER 'R' AT THE '?' . AS BEF
ORE , ANY  OTHER INPUT WILL ADVANCE YOU DIRECTLY TO THE QUIZ. ";Z$
:IFZ$="R"THEN30
220 CLS:PRINT"  WELCOME TO THE QUIZ. YOU WILL BE GIVEN TEN QUESTIO
NS ON PERI- METERS,WHICH YOU WILL NEED TO HAVE A PAPER AND PENCIL
WITH WHICHTO WORK OUT THE PROBLEMS. IF YOU DO GOOD YOU WILL BE ";
221 R=0
240 PRINT "ADVANCED TO  3  MORE QUESTIONS,TO BE DETERMINED BY YOUR
 PRESENT AREA OF VO-CATIONAL TRAINING."
250 PRINT" TO START THE QUIZ, PRESS THE SPACE BAR. GOOD LUCK!":GOS
UB5000
260 A=RND(5)+5:CLS:PRINT"PROBLEM#1":PRINT"WHAT IS THE PERIMETER OF
 A CIRCLE WITH A RADIUS OF ";A;:C=INT(2*A*3.1416):GOSUB 6000
270 CLS:A=RND(4)+12:B=RND(5)+3:PRINT"PROBLEM #2":PRINT"WHAT IS THE
 PERIMETER OF A RECTANGLE MEASURING";A;"BY";B;"FEET";:C=2*A+2*B:GO
SUB6000
280 CLS:A=RND(8)+5:PRINT"PROBLEM#3":PRINT"WHAT IS THE PERIMETER OF
 AN OCTAGON, ONE SIDE OF WHICH MEASURES";A;:LETC=8*A:GOSUB6000
290 CLS:PRINT"PROBLEM#4":A=RND(7)+2:PRINT"  WHAT IS THE PERIMETER
OF AN EQUILATERAL TRIANGLE, ONE SIDE OF WHICH MEASURES";A;:C=3*A:G
OSUB6000
300  CLS:PRINT"PROBLEM #5":A=RND(12)+6:B=RND(17)+8:PRINT"A RECTANG
LE HAS A PERIMETER OF";2*A+2*B;". IF ONE SIDE MEASURES";A;",HOW LO
NG IS THE OTHER SIDE ?":C=B:GOSUB6000
310 CLS:PRINT"PROBLEM #6":A=RND(8)+3:B=RND(12)+2:D=RND(4)+6:PRINT"
WHAT IS THE PERIMETER OF AN IRREGULAR TRIANGLE WITH THE SIDES MEAS
URING";A;",";B;",AND";D;:C=A+B+D:GOSUB6000
320 CLS:PRINT"PROBLEM #7":LETA=RND(13)+3:PRINT"HOW LONG IS ONE SID
E OF A HEXAGON WITH A PERIMETER OF";6*A;:C=A:GOSUB6000
330 CLS:PRINT"PROBLEM #8":A=RND(10)+2:PRINT"WHAT IS THE RADIUS OF
A CIRCLE THAT HAS A CIRCUMFERENCE OF";2*A*3.1416;:C=A:GOSUB6000
340 CLS:PRINT"PROBLEM #9":A=RND(8)+2:B=RND(7)+4:C=RND(6)+5:D=RND(4
)+4:PRINT"WHAT IS THE PERIMETER OF AN IRREGULAR QUADRILATERAL WHOS
E SIDES MEASURE";A;",";B;",";C;",AND";D;:C=A+B+C+D:GOSUB6000
350 CLS:PRINT" PROBLEM #10":LETA=RND(8)+3:PRINT"HOW LONG IS ONE SI
DE OF A SQUARE WITH A PERIMETER OF";4*A;:C=A:GOSUB6000
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360 CLS:PRINT"YOU GOT";R;"RIGHT OUT OF 10. THAT'S A SCORE OF"R*10;
"%
370 IFR>=7THEN390
390 PRINT"THAT'S PRETTY GOOD.YOU QUALIFY TO GO ON TO VOCATIONALLY-
ORIENTED PROBLEMS.  WHEN YOU'RE READY TO DO SO, HIT THE SPACE BAR.
":GOSUB5000
400 CLS:PRINT@30,"MENU":PRINT@275,"1";TAB(25);"AUTOMOTIVE":PRINT@3
39,"2";TAB(25);"BEAUTY CULTURE":PRINT@403,"3";TAB(25);"CLIMATE CON
TROL":PRINT@467,"4";TAB(25);"ELECTRICAL":PRINT@531,"5";TAB(25);"ME
D. DENT. TECH.";
410 PRINT@595,"6";TAB(25)"REC. VEHICLES":PRINT@659,"7";TAB(25);"WO
ODWORKING (CARPENTRY)"
420 PRINT @64, "PLEASE ENTER THE NUMBER CORRESPONDING TO YOUR VOCA
TIONAL FIELD";:INPUT Q
430 R=0
440 FOR V1=1TO3
450 CLS:PRINT "VOC PROBLEM #";V1
460 ON Q GOTO 1000,1010,1020,1030,1040,1080,2030
470 GOSUB 6000
475 RETURN
480 NEXT V1
490 CLS:PRINT "YOU GOT";R;"RIGHT OUT OF 3 ":IF R>0 THEN 505
500 PRINT "THAT'S REALLY NOT TOO GOOD YOU KNOW? I'D GO OVER THIS P
ROGRAM ATLEAST ONCE MORE.":PRINT:PRINT:PRINT:PRINT:END
505 ON R GOTO 510,520,530
510 PRINT "THAT COULD BE BETTER. IF I WERE YOU I WOULD GO OVER THI
S PROGRAMONCE MORE":PRINT:PRINT:PRINT:PRINT:END
520 PRINT "THAT'S NOT BAD. BUT YOU MIGHT WANT A REFRESHER SOME MON
THS FROM NOW.":PRINT:PRINT:PRINT:PRINT:END
530 PRINT "THAT'S GREAT!! CONGRATULATIONS!! A PERFECT SCORE.":PRIN
T:PRINT:PRINT:PRINT:PRINT:END
1000 ON V1 GOTO 1001,1002,1003
1001 A=RND(2)+1: PRINT "IF A CERTAIN MAKE OF CAR REQUIRES A PISTON
 WITH A CIRCUMFERENCE OF "A*2*3.1416;"INCHES, WHAT IS THE PISTON'S
 DIAMETER"; : C=78:GOSUB 470
1002 A=RND(6):B=RND(5):PRINT"YOU ARE GOING TO INSTALL A SUNROOF ON
 THE TOP OF A VAN. HOW MUCH RUBBER STRIPPING WILL YOU NEED IF IT M
EASURES ";A;" BY ";B;"FEET";:C=2*A+2*B:GOSUB 470
1003 PRINT" YOU HAVE IN YOUR POSSESSION A TRIANGLULAR SHAPED PIECE
 OF SHEET METAL WITH IT,  YOU MUST FILL AN IDENTICALLY SHAPED HOLE
 WHOSE PERIMETER IS 6 INCHES LESS THAN THAT OF THE PIECE YOU HOLD.
  HOW MUCH METAL MUST BE TRIMMED FROM EACH END ";
1004 PRINT " OF THE PIECE TO MAKE IT FIT";:C=2:GOSUB 470
1005 GOTO 490
1010 ONV1GOTO1011,1012,1013
1011  A=RND(5)+3:B=RND(5)+3:PRINT" IN THE BEAUTY SHOP WHERE YOU WO
RK, YOUR STATION IS AN AREA MEA-SURING";A;"FEET BY" ;B;"FEET.  WHA
T IS THE PERIMETER OF YOUR STATION";:C=2*A+2*B:GOSUB470
1012 A=RND(4)+8:PRINT"YOU HAVE JUST COMPLETED A LARGE 'NATURA
L'OR AFRO, AND IDLY NOTICE THAT THE DISTANCE FROM ONE SIDEOF THE H
AIR-DO TO THE OTHER IS "2*A;"INCHES.  WHAT IS THE CIRCUMFERENCE OF
 THE STYLE";:C=INT(2*A*3.1416):GOSUB 470
1013 A=RND(8)+4:PRINT" YOU ARE THE OWNER OF A NEW BEAUTY SALON,BUI
LT INEE
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      1013 A=RND(8)+4:PRINT" YOU ARE THE OWNER OF A NEW BEAUTY SA
LON,BUILT IN THE FORM OF ANOCTAGON.IF ONE WALL OF THAT OCTAGON MEA
SURES";A;"FEET ACROSS,WHAT IS THE PERIMETER OF THE SALON";:C=8*A:G
OSUB470
1015 GOTO 490
1020 ONV1GOTO1021,1022,1023
1021 A=RND(5)+6:PRINT"YOU HAVE A FREE-STANDING AIR CONDITIONING UN
IT THAT COOLS EFFEC-TIVELY WITHIN A RADIUS OF";A;"FEET.  WHAT IS T
HE CIRCUMFERENCE OF THE CIRCLE BOUNDING ITS EFFECTIVE AREA";:C=INT
(A*2*3.1416):GOSUB470
1022 A=RND(10)+10:B=RND(10)+15:PRINT"YOU ARE CONTRACTED TO INSTALL
 A UNOT IN A HOUSE MEASURING";A;"BY";B;"FEET. WHAT IS THE PERIMETE
R MEASUREMENT OF THE AREA THAT THE UNIT MUST MAINTAIN";:C=2*A+2*B:
GOSUB 470
1023 A=RND(12)+23:B=RND(8)+19:PRINT "     YOU HAVE BEEN CONTRACTED
 TO INSTALL AIR CONDITIONERS IN AN OFFICE BUILDING,AND YOUR SPECIF
ICATIONS INDICATE THAT THERE MUSTBE ONE UNIT EVERY 8 FEET. iF THE
BUILDING MEASURES";A;"BY";B;",HOW MANY;
1024 PRINT"UNITS CAN BE INSTALLED PER FLOOR";:C=INT((2*A+2*B)/8):G
OSUB470
1025 GOTO 490
1030 ONVIGOTO1031,1033,1034
1031 A=RND(5)+7:B=RND(6)+8:PRINT"THE ROOM YOU ARE WORKING IN REQUI
RES A DOUBLESWITCH CIRCUIT FOR THE CONTROL OF AN OVERHEAD LIGHT. T
HE SWITCHES ARE TO BE PLACED EXACTLY OPPOSITE EACH OTHER.  IF THE
ROOM IS";A;"BY";B;",  HOW FAR APART ARE THEY";
1032 C=A+B:GOSUB 470
1033 A=RND(3)+9:PRINT "A BULB CASTS A CIRCLE OF LIGHT WITH A CIRCU
MFERENCE OF";2A*3.1416;". wHAT IS THE RADIUS OF THAT CIRCLE";:C=A:
GOSUB 470
1034 A=RND (4)+23:B=RND(7)+15:PRINT"      ELECTRICAL CODES REQUIRE
 ONE OUTLET EVERY 10 FEET. IF YOU ARE INSTALLING OUTLETS IN A ROOM
 THAT IS";A;"BY";B;"FEET,HOW MANY OUTLETS CAN YOU INSTALL THERE";
1035 C=INT((A+B)/5):GOSUB 470
1037 GOTO 490
1040 ONV1GOTO 1041,1042,1043
1041 A=RND(4)+6:PRINT "THE PERIMETER MEASUREMENT OF ONE DOCTOR'S O
FFICE IS";2*A+20;".IF ONE WALL IS 10 FEET ,WHAT IS THE OTHER";:C=A
:GOSUB 470
1050 A=RND(4)+8:PRINT"   THE DENTIST YOU ARE WORKING WITH IS REPLA
CING THE RUBBER MAT UNDER THE DENTIST'S CHAIR. ITS DIAMETER IS "2*
A;" INCHES. WHAT IS ITS CIRCUMFERENCE";:C=INT(2*A*3.14):GOSUB 470
1060 A=RND(4)+6:PRINT "  YOU ARE INSTRUCTED BY THE DOCTOR TO FIND
A ROOM FOR A PATIENT THAT HAS A PERIMETER OF ";2*A+30;" FEET.IF ON
E WALL IN A ROOM MEASURES15 FEET WHAT MUST THE OTHER WALL BE TO ME
ET THE DOCTOR'S SPECIF-ICATIONS";:C=A:GOSUB470
1070 GOTO 490
1080 ON V1 GOTO 1090,2000,2010
1090 A=RND(10)+5:B=RND(5)+5:PRINT"YOU HAVE AN ORDER TO COVER THE T
OP OF A CAMPER WITH WEATHERPROOF TARPAPER.THE LENGTH OF THE CAMPER
 IS ";A;" FEET AND THE WIDTH IS ";B;" FEET. WHAT IS THE PERIMETER
OF THE PIECE OF PAPER YOU ";
1092 PRINT"WILL NEED TO COVER THE TOP OF THE CAMPER?";:C=2*A+2*B:G
OSUB 470
```

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2000 A=RND(3)+1:PRINT"      YOU ARE INSTRUCTED TO INSTALL A ROUND
TABLE IN A VAN. THE DIAMETER OF THE TABLE IS ";A;" FEET. WHAT WILL
 ITS PERIMETER BE?";:C=INT(A*3.1416):GOSUB 470
2010 A=RND(3)+2:PRINT"YOUR JOB FOR TODAY IS TO INSTALL A CARPET IN
 THE BACK OF A JEEP WITH A PERIMETER OF ";2*A+10;" FEET. ONE SIDE
OF THE FLOOR MEASURES 5 FEET. WHAT IS THE LENGTH OF THE OTHER SIDE
?";:C=A:GOSUB 470
2020 GOTO 490
2030 ON V1 GOTO 2040,2060,2080
2040 A=RND(4):IF A=1THEN X=400
2041 IF A=2 THEN X=440
2042 IF A=3 THEN X=480
2043 IF A=4 THEN X=520
2045 PRINT"YOU HAVE BEEN GIVEN A ROLL OF FENCE ";X;" FEET LONG.WHA
T IS THE MAXIMUM SQUARE AREA YOU CAN COVER?";:C=X/4:GOSUB470
2060 A=RND(10)+10:PRINT"THE HOUSE YOU ARE BUILDING REQUIRES A ROUN
D DINING ROOM WIDTH A DIAMETER OF ";A;" FEET. WHAT WILL ITS PERIME
TER BE?";:C=INT(A*3.1416):GOSUB 470
2080 A=RND(10)+10:PRINT"    THE PLANS YOU ARE WORKING WITH REQUIRE
 ALIVING ROOM WITH A PERIMETER OF ";2*A+20;" FEET.IF THE LENGTH O
F ONE WALL IS 10 FEET WHAT IS THE LENGTH OF THE OTHER WALL?";:C=A:
GOSUB 470
3000 GOTO 490
5000 A$=INKEY$:IFA$=" "THEN RETURN ELSE5000
6000 INPUT A$
6030 LET A=INT (VAL(A$))
6035 IF A=C THEN 6040 :ELSE GOTO 6050
6040 CLS:PRINT"THAT IS CORRECT !!":R=R+1:GOTO 6060
6050 CLS:PRINT"SORRY THAT IS INCORRECT"
6060 PRINT"TO GO ON, HIT THE SPACE BAR!":GOSUB 5000
6070 CLS:RETURN
```

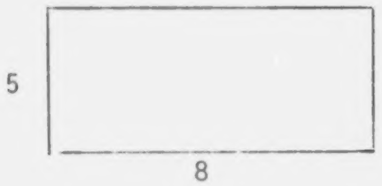
PERIMETER

Peer Tutoring Reference Guide

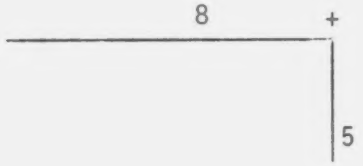
Perimeters are easily found once we understand what perimeters are. Webster defines perimeter as "the boundary of a closed plane figure."

Example I

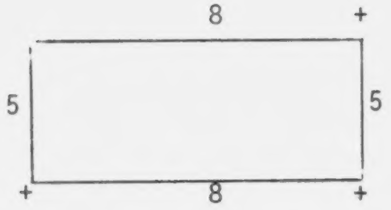
If you want to find the perimeter of a rectangle, you could use the formula P = 2L + 2W. In other words, 2 lengths + 2 widths = perimeter



Here we see that the length is 8 the the width is 5. The perimeter is the distance around the figure. So starting at any given point



and travel until we return to the original point

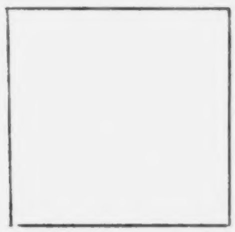


We see 8 + 5 + 8 + 5 would be the total distance around the rectangle.

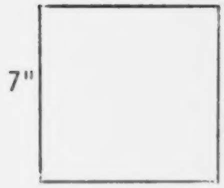
Now let's look at a square. Since every square is a rectangle, we could go about finding the perimeter of a square the same way OR if we understand that all sides of the square are equal, we can just: Perimeter of a Square = 4 x the side

or

$P = 4s$



So if the side of the square is 7", then the perimeter is 28"



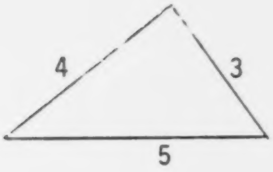
7 + 7 + 7 + 7 OR

4 (S)

4 (7) = 28 inches

Example II

You should have no problem finding the perimeter of a triangle if you realize what perimeter is.



In this triangle, the perimeter is 12. We arrived at this by adding the lengths of the sides. In other words,

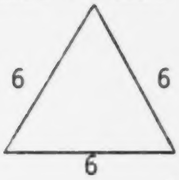
Perimeter = A + B + C
12 = 3 + 4 + 5

So the distance around the triangle, or the perimeter of this triangle, is 12.

Sometimes we will want to find the perimeter of a special triangle that is an equilateral triangle. If we break the word "equilateral" down, we will see that

equi means equal
and
lateral means lengths (sides)

In other words, an equilateral triangle is a triangle with three (3) equal sides or lengths. If we are asked to find the perimeter of an equilateral triangle with a side of 6", we could use the formula that is used for all triangles



A + B + C = P
6 + 6 + 6 = 18

or

we can multiply the length of the side by 3.
The formula for the perimeter of an equilateral triangle is

3 x the side or P = 3(s) or 18 = 3 (6)

Example III

The perimeter of any figure is just the distance around the figure on the outer edge. If we wish to find the perimeter of any regular polygon, we will have no problem if we can defing the words:

"regular" and "polygon"

First, POLYGON - a polygon is a many-sided figure.

Triangles are polygons - they have three sides.

However, there are many other polygons. Here are some of the more commonly used ones:

quadrilaterals - all four-sided figures (includes parallelograms, trapezoids, squares, rectangles and rhombi)

pentagons - five-sided figures

hexagons - six-sided figures

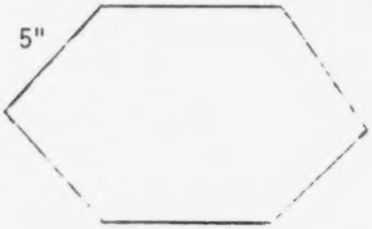
octagons - eight-sided figures

A regular polygon is a figure where all the sides are of equal length and all the angles have the same measure. We have already looked at --

a regular triangle - that is, an equilateral triangle

a regular quadrilateral - that is, a square

Now, let's look at a regular hexagon:



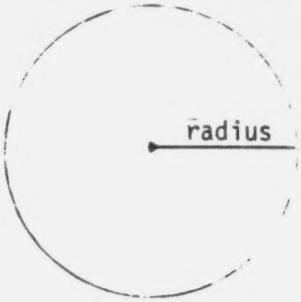
If we are told that this is a regular hexagon and we are given that one side is 5", we can find the perimeter by taking the length of the side and multiplying by 6 since all of the sides are equal.

P = 5" (6) or P = 30"

Remember, in a regular polygon, all sides are equal.

Example IV

We are sometimes asked to find the "perimeter" or outer edge of a circle. We will call this a circumference. Before we can determine the circumference of a circle, we need to know a few terms used in relationship to the circle.



Radius - the distance from the center of the circle to the outer edge.

Diameter - a line segment which passes through the center of the circle

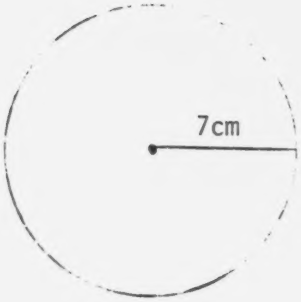
Diameter = 2 x radius
D = 2r

We use the following formula:

Circumference = 2 x radius x π

in other words

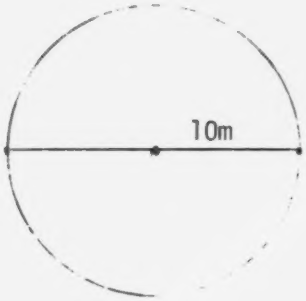
$C = 2r\pi$ ($\pi = 3.14$)



If we know the radius is 7 cm, then the circumference (outer edge)

$C = 2 \times 7 \times 3.14$
$C = 14 \times 3.14$
$C = 43.96$ cm

If we are given the diameter and we realize that the diameter = 2 x radius then we can also find the circumference by saying

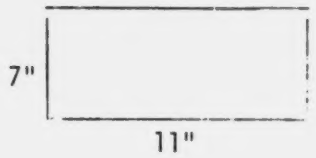


Circumference = $\overset{(2r)}{\text{diameter}} \times \pi$
diameter = 10m
Circumference = $10 \times \pi$
or
$C = 10 \times 3.14$
$C = 31.4$ m

PERIMETER

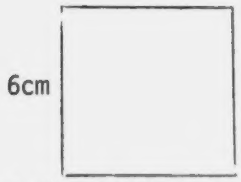
Worksheet

1. Find the perimeter of a rectangle with a length of 11 inches and a width of 7 inches.



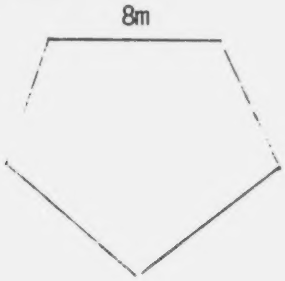
Perimeter = ________________

2. Find the perimeter of a square when the length of a side is 6 cm.



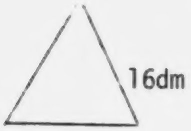
Perimeter = ________________

3. Find the perimeter of a regular pentagon when the length of a side is 8 meters.



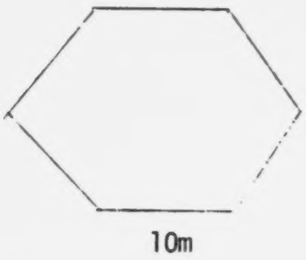
Perimeter = ________________

4. Find the perimeter of an equilateral triangle when the length of a side is 16 dm long.



Perimeter = ________________

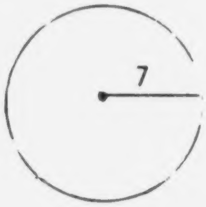
5. Find the perimeter of a regular hexagon when the length of a side is 10 m.



Perimeter = ________________

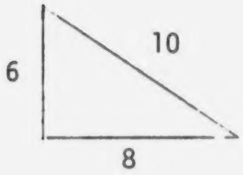
Worksheet, continued

6. Find the circumference of a circle with a radius of 7.



Circumference = ________________

7. Find the perimeter of a triangle with sides 6m, 8m, and 10m.

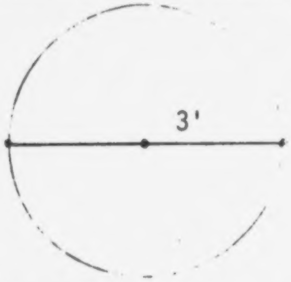


Perimeter = ________________

8. Find the perimeter of a regular octagon when the length of a side is 9 ft.

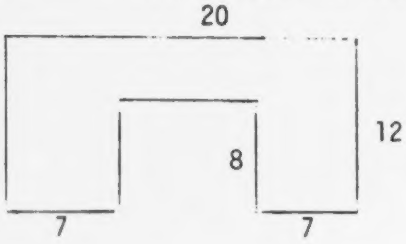
Perimeter = ________________

9. Find the circumference of a circle with a diameter of 3 feet.



Circumference = ________________

10. Find the perimeter of the following figure:



Perimeter = ________________

PERIMETER

Application Word Problems

1. You are going to install a sunroof on the top of a van. How much rubber stripping will you need if it measures 2 feet by 3 feet?

2. If a perm rod has a radius of 3 cm, what is its circumference?

3. A Luxaire 5,000 BTU air conditioning unit has a length of 4½ feet and a width of 2 3/4 feet. You have been employed to reline the unit. What is its perimeter?

4. You have been contracted to install air conditioning units in an office building and your specifications call for one unit every 12 feet on the outside walls. If the building measures 48 x 36, how many units are needed per floor?

5. A circular light fixture casts a shadow that has a radius of 18". What is the circumference of the circle?

6. An electrical code requires one outlet every eight feet. If you are installing outlets in a room that is 10 x 12, what is the minimum number of outlets required?

7. A triangular distress symbol has sides each of which measures 11". What is its perimeter?

Application Word Problems, continued

8. A hospital bed has a length of 7' and a width of 4'. What is its perimeter?

9. An above-the-ground pool has a diameter of 18'. What is its circumference?

10. A triangular shaped pop-up roof on a camper measures 3 x 3 x 4. What is its perimeter?

I. PROGRAM TITLE - "Polygon Concentration"

II. PROGRAM DESCRIPTION
   A. Students will match polygons with their definitions.
   B. Data lines are used in this program.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide that deals with Basic Instruction unit for polygons.
   B. Worksheet matching definitions with the various terms used when working with polygons.
   C. Additional Sources
      1. Eugene D. Nichols et al., Holt Geometry (New York: Holt Rinehart and Winston, 1978), pp. 191-218.
      2. Foster, Cummins and Yunker, Merrill Geometry (Columbus, Ohio: Bell and Howell Co., 1981), pp. 194-228.

V. SKILLS NEEDED
All operations using whole and fractional numbers.

POLYGON CONCENTRATION

THE FOLLOWING DATA LINES ARE DESIGNED FOR PROGRAM # 20

THEY ARE TO BE USED IN THE MAIN CONCENTRATION PROGRAM WHOSE LISTING APPEARS IN PROGRAM # 10

IF YOU WISH TO MAKE UP YOUR OWN VERSION, PLEASE REPLACE LINES 1000 - 1004 WITH YOUR OWN DATA IN THE SAME ORDER.

```
1000 DATA POLYGONS
1001 DATA 5 SIDES, ,3 SIDES, ,4 SIDES, ,8 SIDES,
1002 DATA 6 SIDES, ,10 SIDES, ,REGULAR QUADRILATERAL, ,7 SIDES,
1003 DATA PENTAGON, ,TRIANGLE, ,QUADRILATERAL, ,OCTAGON,
1004 DATA HEXAGON, ,DEKAGON, ,SQUARE, ,SEPTAGON,
```

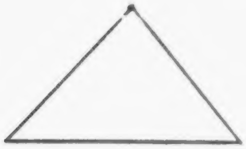
POLYGON CONCENTRATION

Peer Tutoring Reference Guide

A polygon can be defined as the union of three or more segments which intersect only at their endpoints.

EXAMPLE I

A triangle is the union of 3 sides or segments which intersect only at their endpoints.

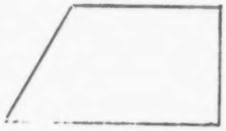


3 angles

3 sides

EXAMPLE II

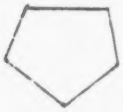
A quadrilateral has four sides. This can be seen when we break the word down into two parts:



quad	4
lateral	lengths

EXAMPLE III

A pentagon can be seen as



penta	5
and	
gon	sides

And so we can see the name for each polygon is determined by the number of sides and angles that it possesses.

POLYGON CONCENTRATION

Worksheet

Match Column A with Column B.

COLUMN A

________ 1. octagon

________ 2. hexagon

________ 3. pentagon

________ 4. quadrial

________ 5. perimeter

________ 6. triangle

________ 7. square

________ 8. equilateral triangle

________ 9. septagon

________10. dekagon

________11. area

________12. polygon

COLUMN B

a. 10 sided
b. multi-sided
c. 8 sided
d. regular quadrilateral
e. 4 sided
f. surface
g. 5 sided
h. 6 sided
i. 7 sided
j. regular triangle
k. outer edge
l. 3 sided

POLYGON CONCENTRATION

Worksheet

Match Column A with Column B. Use each only once.

COLUMN A

_______ 1. $A = b \cdot h$

_______ 2. $A = \frac{1}{2}b \cdot h$

_______ 3. $P = 2(l + w)$

_______ 4. $A = S^2$

_______ 5. $A = \frac{1}{2}h\ (b_1 + b_2)$

_______ 6. $A = \quad r^2$

_______ 7. $C = 2r$

_______ 8. $P = 4(s)$

COLUMN B

a. area of a square
b. perimeter of a rectangle
c. area of a circle
d. area of a rectangle
e. circumference of a circle
f. area of a triangle
g. perimeter of a square
h. area of a trapezoid

I. PROGRAM TITLE - "Area"

II. PROGRAM DESCRIPTION
   A. Students will view a brief tutorial section which includes area of a rectangle, triangle and circle.
   B. Students will solve area problems.
   C. All problems are randomly generated.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide
   B. Worksheet (including area of):
      1. rectangles
      2. triangles
      3. trapezoids
      4. circles
   C. Application Word Problems
   D. Additional Sources
      1. Mervin L. Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), Chapter 11, pp. 318-325.
      2. Price et al., Mathematics for the Real World (Columbus, Ohio: Charles E. Merril, 1978), Chapter 9, pp. 152-177.

V. SKILLS NEEDED
Multiplication of whole numbers, decimals and fractions; squaring numbers and identification of polygons.

```
1 REM ***********************************************************
2 REM ******  AREAS OF BASIC GEOMETRIC SHAPES  ***************
3 REM ******  BY ROBERT SCHROECK, PRINCETON, CLASS OF  ******
4 REM ******  1984.  CREATED ON AUGUST 19, 1980  *************
5 REM ******  FOR COMPUTER-AIDED VOCATIONAL EDUCATION  ******
6 REM ***********************************************************
10 CLS:PRINT@275,"AREAS OF BASIC SHAPES"
11 FORY=9TO16:SET(34,Y):SET(83,Y):NEXTY
15 FORX=34TO83:SET(X,9):SET(X,16):NEXTX
20 PRINT:PRINT:PRINT:PRINT:PRINT:PRINT" IF YOU WANT A REVIEW OF TH
E SHAPES AND THEIR FORMULAS, PLEASE   ENTER 'R'. ANY OTHER RESPONS
E WILL ADVANCE  THE PROGRAM TO THE QUIZ."
30 PRINT:INPUT"REVIEW";A$:IFA$<>"R"THEN960
40 CLS:PRINT@275,"      RECTANGLES":FORY=16TO9STEP-1:SET(34,Y):SET(
83,Y):NEXTY
41 FORX=83TO34STEP-1:SET(X,9):SET(X,16):NEXTX
50 PRINT@448,"THE REVIEW WILL STOP AT DIFFERENT SPOTS TO ALLOW YOU
 TO STUDY AS LONG AS YOU LIKE.  WHEN YOU WISH TO GO ON, HIT THE  S
PACE BAR."
51 GOSUB3000
60 PRINT@458,"

            "
70 PRINT@534,"AREA = L * H"
80 PRINT@576,"THE AREA OF A RECTANGLE IS EASY TO CALCULATE.  ALL
YOU DO IS      MULTIPLY THE LENGTH";
81 GOSUB3000
90 FORX=1TO40
95 PRINT@401,"[----------------------["
96 PRINT@541," "
97 FORY=1TO20:NEXTY
98 PRINT@541,"L"
99 PRINT@401,"                         "
100 NEXTX
105 GOSUB3000
110 PRINT@660," BY THE HEIGHT";
120 FORX=1TO40
121 PRINT@545," "
125 FORY=1TO20:NEXTY
128 PRINT@545,"H"
130 NEXTX
140 GOSUB3000
150 PRINT@674," TO GET THE AREA IN SQUARE     UNITS."
160 PRINT"FOR EXAMPLE, A RECTANGLE THAT IS 11 UNITS LONG AND 4 UNI
TS HIGH HAS AN AREA OF:"
170 PRINT@915,"11 * 4, OR 44 SQUARE UNITS."
180 GOSUB3000
190 CLS:PRINT@522,"DON'T FORGET -- A SQUARE IS A RECTANGLE, TOO!"
200 GOSUB3000
210 CLS:FORX=52TO69:SET(X,11):NEXTX
```

```
215 LETD=1:FORY=10TO3STEP-1
220 LETX1=52+D:X2=69-D
230 SET(X1,Y):SET(X2,Y)
240 LETD=D+1:NEXTY
250 PRINT@346,"TRIANGLES"
260 PRINT@406,"AREA = 1/2 B * H"
270 PRINT@512,"THE TRIANGLE IS A LITTLE MORE DIFFICULT.  WITH A TR
IANGLE,  YOU MUST FIRST MULTIPLY THE BASE"
280 GOSUB3000
290 FORX=1TO40
300 PRINT@281,"[--------["
310 PRINT@417," "
320 FORY=1TO20:NEXTY
330 PRINT@281,"          "
340 PRINT@417,"B"
350 NEXTX
360 GOSUB3000
370 PRINT@605,"BY THE HEIGHT,"
380 FORX=1TO40
390 PRINT@421," "
400 FORY=10TO4STEP-1
410 SET(60,Y)
420 FORQ=1TO5:NEXTQ
430 RESET(60,Y)
440 NEXTY
450 PRINT@421,"H"
460 NEXTX
470 GOSUB3000
480 PRINT@621,"THEN MULTIPLY WHAT YOU GET BY ONE HALF, OR DIVIDE I
T BY TWO (IT'S THE SAME THING,  REALLY)."
490 FORX=1TO40
500 PRINT@413,"   "
510 FORY=1TO20:NEXTY
520 PRINT@413,"1/2"
530 NEXTX
540 GOSUB3000
550 PRINT:PRINT"REMEMBER -- YOU'RE MULTIPLYING THE BASE TIMES THE
hEIGHT; NOT   ANOTHER SIDE OF THE TRIANGLE.  dON'T MAKE THAT MISTA
KE!!! UNLESSTHE HEIGHT IS A SIDE OF THE TRIANGLE  (FOR INSTANCE, I
N A RIGHT TRIANGLE)."
560 GOSUB3000
570 CLS:PRINT@27,"CIRCLES":SET(60,15):SET(61,15):PRINT@351,"C"
580 SET(43,15):SET(46,11):SET(46,20):SET(51,8):SET(51,22):SET(60,7
):SET(60,23):SET(69,8):SET(69,22):SET(75,11):SET(76,20):SET(78,15)
590 PRINT@598,"AREA = PI * R * R"
600 PRINT@646,"CIRCLES ARE A BIT MORE DIFFICULT.  BUT NOT VERY MUC
H SO.  aLL YOU HAVE TO DO IS TAKE THE RADIUS(WHICH IS HALF THE DIA
METER),"
610 GOSUB3000
615 FORY=1TO20
620 FORX=44TO59
630 SET(X,15)
```

```
640 FORQ=1TO5:NEXTQ
650 RESET(X,15)
660 NEXTX
665 NEXTY
670 GOSUB3000
680 PRINT@768,"SQUARE IT (THAT MEANS MULTIPLY IT BY ITSELF),"
685 GOSUB3000
690 FORX=1TO80
700 PRINT@610,"      "
710 FORQ=1TO5:NEXTQ
720 PRINT@610, "R * R"
730 NEXTX
740 GOSUB3000
750 PRINT@814,"THEN MULTIPLY WHATYOU GOT BY PI."
760 GOSUB3000
770 FORX=1TO80
780 PRINT@605,"  "
790 FORQ=1TO5:NEXTQ
800 PRINT@605,"PI"
810 NEXTX
820 GOSUB3000
830 PRINT@896,"PI IS A REAL LONG NUMBER THAT GOES ON AND ON FOREVE
R, BUT FOR   OUR PURPOSES, WE'LL USE THE VALUE 3.1416 FOR PI."
840 GOSUB3000
850 PRINT@512,"



                                                   "
860 PRINT@768,"



                                                    "
870 PRINT@670,"                                       "
880 PRINT@576,"FOR EXAMPLE, LET'S SAY A CIRCLE HAD A RADIUS OF 6,
AND YOU WANT TO FIND ITS AREA.  YOU WOULD WRITE IT OUT LIKE THIS:"
890 PRINT@726,"3.1416 * 6 * 6"
900 PRINT@790,"3.1416 * 36 = 113.098"
910 GOSUB3000
915 GOSUB 7000
920 CLS:PRINT@532,"NOW ON TO THE QUIZ!!!!!"
930 GOSUB3000
940 CLS:PRINT@522,"DO YOU WANT TO REVIEW JUST TO MAKE SURE";:INPUT
A$
950 IFA$="Y"ORA$="YES"THEN40
960 CLS:PRINT@390, "THIS IS THE QUIZ.   YOU WILL NEED A PENCIL AND
 PAPER.                    pLEASE ROUND OFF TO NEAREST WHOLE NUMBER.
"
970 PRINT@586, "PLEASE PRESS SPACE BAR TO GO ON TO PROBLEMS"
980 GOSUB3000
985 LETR=0
986 E=1
990 CLS:LETA=RND(40):LETB=RND(40):PRINT"PROBLEM #1":PRINT"WHAT IS
THE AREA OF A TRIANGLE HAVING A BASE MEASURING";A;"AND A  HEIGHT O
F";B;:LETC=INT(.5*(A*B)+.5):GOSUB4000
995 E=E+1
```

```
1000 CLS:LETA=RND(40):LETB=RND(40):PRINT"PROBLEM #2":PRINT"WHAT IS
 THE AREA OF A RECTANGLE MEASURING";A;"BY";B;:LETC=A*B:GOSUB4000
1005 E=E+1
1010 CLS:LETA=RND(40):PRINT"PROBLEM #3":PRINT"WHAT IS THE AREA OF
A CIRCLE WITH A RADIUS OF";A;:LETC=INT( (A*A*3.1416)+.5):GOSUB4000
1015 E=E+1
1020 CLS:LETA=RND(40):LETB=RND(40):PRINT"PROBLEM #4":PRINT"   WHAT
 IS THE AREA OF A RECTANGLE THAT IS";B;"UNITS HIGH AND";A;"UNITS L
ONG";:LETC=A*B:GOSUB4000
1025 E=E+1
1030 CLS:LETA=RND(40):LETB=RND(40):PRINT"PROBLEM #5":PRINT"    WHA
T IS THE AREA OF A RECTANGLE THAT IS";B;"UNITS LONG AND";A;"UNITS
HIGH";:LETC=A*B:GOSUB4000
1035 E=E+1
1040 CLS:LETB=RND(20)+8:PRINT"PROBLEM #6":PRINT"WHAT IS THE AREA O
F A CIRCLE THAT HAS A RADIUS OF";B;:LETC=INT((B*B*3.1416)+.5):GOSU
B4000
1045 E=E+1
1050 CLS:LETA=RND(20)*2:B=RND(20):PRINT"PROBLEM #7":PRINT"WHAT IS
THE AREA OF A TRIANGLE";A;"UNITS HIGH, AND HAVING A BASE MEASURING
";B;:LETC=A*B*.5:GOSUB4000
1055 E=E+1
1060 CLS:LETA=RND(30)+4:PRINT"PROBLEM #8":PRINT"WHAT IA THE AREA O
F A CIRCLE WITH A RADIUS MEASURING"A;"UNITS":LETC=INT((A*A*3.1416)
+.5):GOSUB4000
1065 E=E+1
1070 CLS:LETA=RND(30):B=RND(30):PRINT"PROBLEM #9":PRINT"WHAT IS TH
E AREA OF A TRIANGLE WITH A BASE";A;"UNITS LONG AND     WHICH IS";
B;"UNITS HIGH";:LETC=INT((A*B*.5)+.5):GOSUB4000
1075 E=E+1
1080 CLS:LETA=RND(40):B=RND(40):PRINT"PROBLEM #10":PRINT"   WHAT I
S THE AREA OF A RECTANGLE THAT IS";A;"UNITS HIGH AND";B;"UNITS LON
G";:LETC=A*B:GOSUB4000
1081 CLS:H = RND(10):B1=RND(20):B2=RND(15)*2 :PRINT "PROBLEM #11":
PRINT "WHAT IS THE AREA OF A TRAPEZOID IF IT HAS A HEIGHT OF"H" AN
D ITSBASES MEASURE"B1" AND"B2".":C =INT( ( .5*H*(B1+B2))+.5):E=E+1
:GOSUB 4000
1082 CLS:PRINT"PROBLEM #12":PRINT"WHAT IS THE HEIGHT OF A TRAPEZOI
D ";:A=RND(100)+50:B(1)=RND(10)+5:B(2)=RND(10)+5:PRINT"WITH BASES
OF"B(1)" AND"B(2)" AND AN AREA OF "A".":C=INT(((2*A)/(B(1)+B(2)))+
.5):E=E+1
1083 GOSUB4000
1090 CLS:PRINT@388,"  YOU HAD";R;" RIGHT OUT OF A POSSIBLE ";E;"."
:PRINT@518," THIS GIVES YOU A SCORE OF";(R/E)*100;"%."   :PRINT@64
6,"PLEASE HAVE THIS RECORDED BY THE TEACHER."
1091 IF E>=12 GOTO 1099
1092 PRINT"ENTER 'R' TO CONTINUE OR 'C' TO GO ON TO SPECIALTY AREA
"
1093 A$=INKEY$: IF A$="R" THEN RETURN
1094 IF A$="C" GOTO 8000
1095 GOTO 1093
1099 GOSUB 3000:GOTO 8000
1100 PRINT:PRINT:PRINT:PRINT:PRINT:END
3000 A$=INKEY$:IFA$=" "THENRETURN
3001 IF A$="S":GOTO 1090:ELSE 3000
3002 GOTO 3000
4000 INPUT A$
```

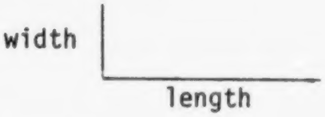
```
4010 LET D = INT(VAL(A$))
4020 IF C = D THEN PRINT@590, "THAT IS THE CORRECT ANSWER !!!":R =
 R+1:ELSE PRINT@585, "SORRY, THE CORRECT ANSWER IS "C" SQUARE UNIT
S."
4030 GOSUB 3000
4040 RETURN
7000 CLS
7010 FOR X = 55 TO 75:SET (X,4):NEXT
7020 FOR X = 40 TO 90:SET(X,12):NEXT
7030 Y = 4:FOR X = 55 TO 40 STEP -2:SET(X,Y):Y=Y+1:NEXT
7040 Y=4:FOR X = 75 TO 90 STEP 2:SET(X,Y):Y=Y+1:NEXT
7080 PRINT@470, "THIS IS A TRAPEZOID!!!"
7090 PRINT@600, "IT HAS 4 SIDES !"
7100 PRINT@704, "IN THE FIGURE ABOVE, THE SOLID LINES ARE KNOWN AS
 THE BASES AND                    THE DOTTED LINES AS THE LEGS."
7110 PRINT@908, "FLASHING IS THE HEIGHT OF THE TRAPEZOID !"
7120 FOR N= 1 TO 20:FOR Y = 5 TO 11 :SET(55,Y):FOR E = 1 TO 5:NEXT
:RESET(55,Y):NEXT:NEXT
7130 GOSUB 3000
7140 CLS
7150 PRINT@64, "TO FIND THE AREA OF THE TRAPEZOID, YOU MUST FOLLOW
 THIS FORMULA."
7160 PRINT@140, "AREA  =  1/2  X  H  X ( B1 + B2)
7170 PRINT@192, "WHERE"
7180 FOR N = 1 TO 500:NEXT
7190 PRINT@268, "B1  =  LENGTH OF ONE BASE
7200 FOR N = 1 TO 500:NEXT
7210 PRINT@396, "B2  =  LENGTH OF THE OTHER BASE
7220 FOR N= 1 TO 500:NEXT
7230 PRINT@524, "H  = THE HEIGHT
7240 PRINT@640, "EXAMPLE  -  FIND THE AREA OD A TRAPEZOID WITH BAS
ES MEASURING 12 FEET AND 18 FEET AND A HEIGHT OF 9 FEET.
7250 PRINT@844, "AREA  = 1/2  X   9  X  ( 12 + 18)
7260 PRINT@975, "AREA  =  135 SQUARE FEET
7270 GOSUB 3000
7280 CLS
7285 PRINT@80, "FORMULAS TO REMEMBER !!!
7290 PRINT@194, "IF YOU HAVE NOT COPIED THESE DOWN, DO IT NOW BEFO
RE THE QUIZ!
7300 PRINT@335, "AREA OF RECTANGLE = L X W
7320 PRINT@463, "AREA OF TRIANGLE  = 1/2 X B X H
7330 PRINT@591, "AREA OF CIRCLE    = PI X R X R
7340 PRINT@719, "AREA OF TRAPEZOID = 1/2 X H X ( B1+B2)
7350 PRINT@850, "( PI  =  3.1416 )
7360 GOSUB 3000
7370 RETURN
8000 CLS:PRINT@30,"MENU"
8010 PRINT@275,"1";TAB(25);"AUTOMOTIVE"
8020 PRINT@339, "2";TAB(25)"BEAUTY CULTURE"
8030 PRINT@403, "3";TAB(25)"CLIMATE CONTROL"
8040 PRINT@467,"4";TAB(25);"ELECTRICAL"
8050 PRINT@531,"5";TAB(25);"MED. DENT.TECH."
8060 PRINT@595,"6";TA
```

```
8060 PRINT@595,"6";TAB(25);"REC. VEHICLES"
8070 PRINT@659,"7";TAB(25);"BUILDING TRADES"
8080 PRINT@840," ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FIE
LD";Q
8090 CLS
8093 DIM V$(100)
8094 FORN=1 TO 21:READV$(N):NEXT
8095 GOTO 9100
9010 INPUT C:IFC=INT(Z) PRINT"CONGRATULATIONS!! THAT IS THE CORREC
T ANSWER.":K=K+1:ELSE PRINT"SORRY!! THE CORRECT ANSWER IS ";Z
9011 PRINT"TO GO ON, HIT THE SPACE BAR":GOSUB3000
9020 RETURN
9030 CLS:PRINT@513,"YOUR SCORE IN THE AREA OF YOUR SPECIALTY IS"(K
/3)*100" %"
9031 GOTO 9030
9100 L =RND(25)+20:W=RND(20)+20:PRINT@128,"THE FLOORING AT THE":PR
INT@212,V$(Q):PRINT@256,"WILL BE REPLACED. HOW MANY SQUARE FEET OF
 COVERING WILL BE      NEEDED IF THIS RECTANGULAR AREA MEASURES "L
" BY "W;:Z=L*W:GOSUB 9010
9200 CLS:R=RND(10)+5:PRINT@128,V$(Q+7); :PRINT" ARE CIRCULAR SHAPE
D.":PRINT@256, "IF THE RADIUS OF ONE IS "R", WHAT IS THE AREA OF E
ACH?":Z=INT((R*R*3.1416)+.5):GOSUB 9010
9300 CLS:B=RND(35)+2:H=RND(50):PRINT@128, "THE TRIANGULAR PARKING
LOT OF":PRINT@212,V$(Q+14):PRINT@256,"IT HAS A BASE OF"B" AND A HE
IGHT OF"H".":PRINT@384, "WHAT IS THE AREA?":Z=INT((.5*B*H)+.5):GOS
UB 9010:GOSUB 9030
10000 DATA CAR SALES SHOWROOM,SHAMPOO ROOM,DISPLAY ROOM,WORKROOM,X
-RAY ROOM,GARAGE,WOODS ROOM
10001 DATA HUBCAPS,PROTECTIVE SHOULDER CLOTHS,COMPOUND GAUGES,FLOU
RESCENT LIGHT FIXTURES,CULTURE TRAYS,BUBBLE WINDOWS,TABLE SAW BLAD
ES
10002 DATA GLAD'S GARAGE,CUT&CLIP CORNER,HARRIGAN'S HEATING INC.,L
IVE WIRE INC.,DIAL-A-TOOTH CLINIC,VARIETY VAN CONVERSIONS,BUILDING
 BLOCKS INC.
```

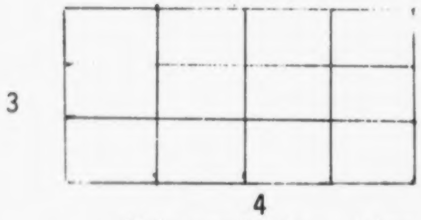
AREA

Peer Tutoring Reference Guide

Area is a surface. We use areas when trying to carpet a room or build a house. When working with area, we are looking at two (2) dimensions.



If we wanted to find the area of a rectangle, we could count the number of square units.



If the length = 4
and the width = 3
the area of this rectangle
would be 12.

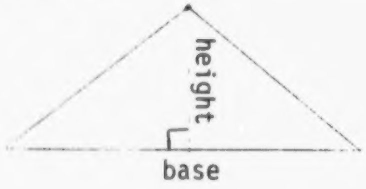
This would be a time-consuming process, so rather than counting the square units each time, we can multiply the length x the width:

Area of a rectangle = length x width

So that if the length = 3 and the width = 4,
the area = 3 x 4

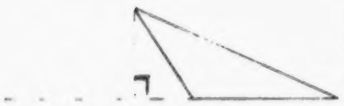
or 12 square units

Before we can find the area of a triangle, we need to identify its parts.



The base can be any side of the triangle. The height must be the line perpendicular to the base used.

In this particular triangle, the height to the given base is inside the triangle.



It could be the side of a triangle as at the left or even outside of the triangle.

The formula for area of a triangle is $\frac{1}{2}b \cdot h$
We know that the area of a triangle is equal to ½ x base x height.

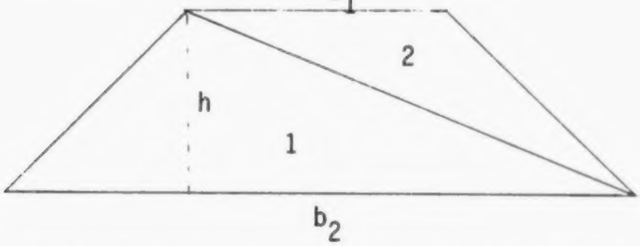
If the base if 10 and the height is 6, then the area would be

$$\frac{1}{2} \times 10 \times 6$$

$$5 \times 6$$

30 square units

A trapezoid is a quadrilateral. When we are trying to find the area of a trapezoid, it will be a breeze if we look at the trapezoid as the area of two (2) triangles.



Since the bases are parellel, the height remains constant.

Area of Triangle I	Area of Triangle II
$A = \frac{1}{2}b \cdot h$	$A = \frac{1}{2}b \cdot h$

If we add the areas together we will derive the formula:

Area of a trapezoid = $\frac{1}{2}h(b_1+b_2)$

When asked to find the area of a cirlce, you will have no difficulty if you understand the terminology involved with a circle:

1. A chord is a segment whose endpoints lie on the circumference of the circle.
2. A diameter is a chord which passes through the center of the circle.
3. A radius is a segment where one endpoint is at the center of the circle and the other endpoint lies on the circumference.

In other words:

Radius = ½ diameter

2 Radii = 1 diameter

The formula for area of a circle is:

$A = \pi \times r^2$ ($\pi = 3.1416$)

So if we are given the radius = 7"

$A = \pi \cdot 7^2$

$A = 3.1416 \times 7^2$

(Remember when you see n^2 this actually means $n \cdot n$ so $7^2 = 7 \cdot 7$)

$A = 3.1416 \times 49$

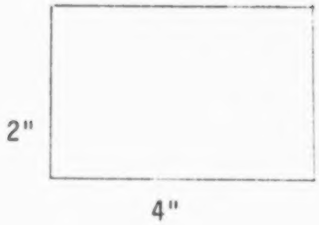
$A = 153.9344$ square inches

rounded to the nearest inch: 154 square inches

AREA

Worksheet

1.



A = ____________________

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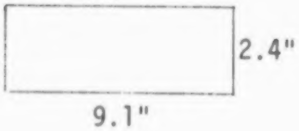

A = ____________________

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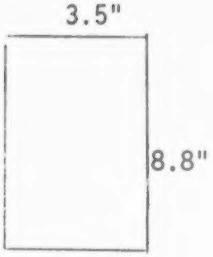

A = ____________________

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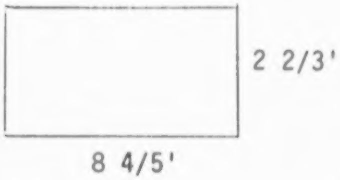
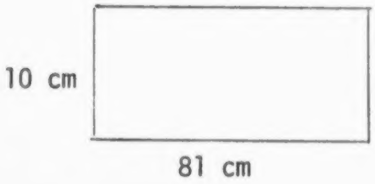


A = ____________________

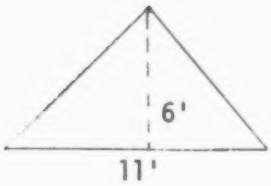
5.



A = ____________________

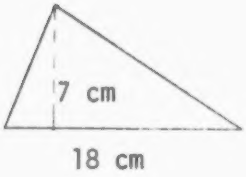
Worksheet, Continued

6.



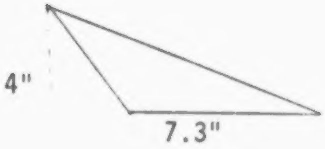
A = ____________

7.



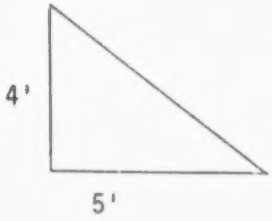
A = ____________

8.



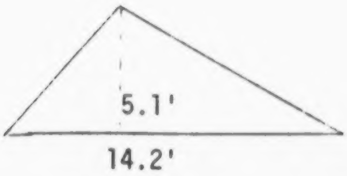
A = ____________

9.



A = ____________

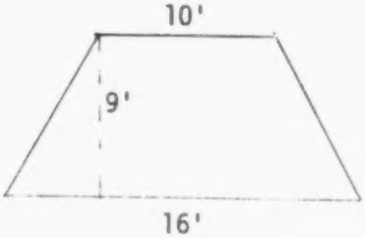
10.



A = ____________

Worksheet, Continued

11.



A = ____________

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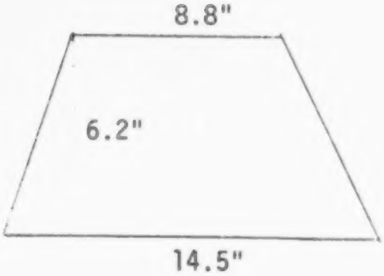

A = ____________

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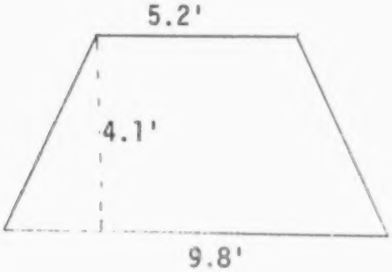

A = ____________

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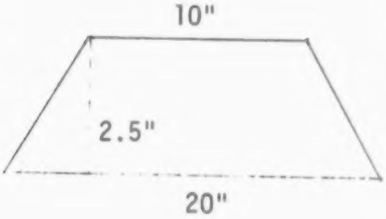
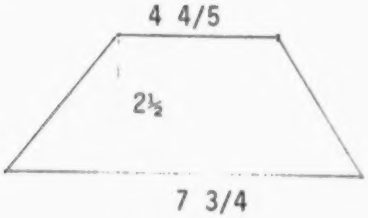


A = ____________

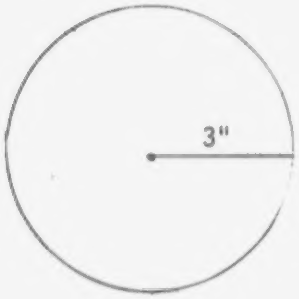
15.



A = ____________

Worksheet, Continued

16.



A = ____________

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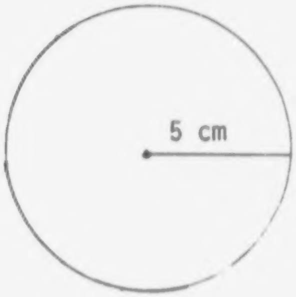
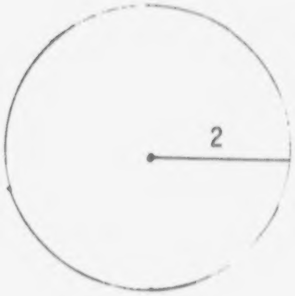


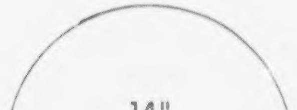
A = ____________

18.



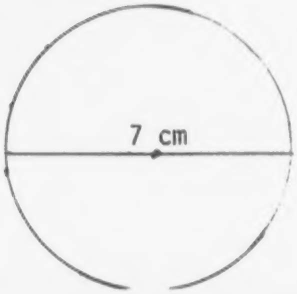
A = ____________

19.



A = ____________

20.



A = ____________

AREA

Application Word Problems

1. Cory's Autobody has 12 bays. If the length of each bay is 18' and the width is 12', what is the area of each bay?

2. The radius of a hair dryer is 9". What is the area?

3. A rectangular bandage has a length of 6½ inches and a width of 4½ inches. What is the area that it will cover?

4. A hubcap has a diameter of 16 inches. What is its area?

5. If a room measures 14' x 16', how many square feet of sub flooring are needed to cover the floor?

6. A triangular cape has a base of 36" and a height of 18". How many square inches of material are used in each cape?

7. A rectangular electrical box has a length of 2½ feet and a width of 1¼ feet. How many square feet of wall space does the box cover?

8. The base of a rectangular air conditioning unit has a length of 4 feet and a width of 3.2 feet. How many square feet does the base cover?

9. The base of a dental chair is in the shape of a trapezoid. How much area is covered by the chair if the bases are 34" and 22" and the height is 18"?

10. A circular chain saw has a diameter of 14". What is the area of the saw's disk?

I. PROGRAM TITLE - "Lateral Area and Total Surface Area"

II. PROGRAM DESCRIPTION
  - A. Students will view tutorial section (Peer Tutoring Reference Guide).
  - B. Students will solve Lateral Area and Total Surface Area problems by substitution into the given formula.
  - C. Students will solve practical application problems.
  - D. Problems are randomly generated.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
  - A. Peer Tutoring Reference Guide
  - B. Worksheet
  - C. Application Word Problems
  - D. Additional Sources
    1. Edwin I. Stein, Refresher Mathematics (Boston: Allyn and Bacon, Inc., 1980), p. 427.
    2. Mervin J. Lyung et al., Career Mathematics (Boston: Houghton Mifflin, Co., 1974), pp. 186-187.

V. SKILLS NEEDED

Multiplication of whole numbers and decimals.

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4 '********************************************
***
5 '****************  LATERAL AREA  ****************
6 '****************   WRITTEN BY    ****************
7 '****************  M. MCNEARNEY  ****************
8 '****************  M. MCALISTER  ****************
9 '****************     2/81       ****************
10 '********* COMPUTER ASSISED VOC. MATH.*********
11 '***********************************************
14 CLS
20 PRINT @384, " ";:INPUT "PLEASE TYPE IN YOUR NAME";A$
90 CLS
95 PRINT @395, "WE WILL BE WORKING WITH LATERAL AREA"
97 GOSUB 6000
99 CLS
100 PRINT @64, "SUPPOSE WE NEED TO KNOW THE AREA OF METAL USED TO
MAKE PIPES.   EACH PIPE HAS THE SHAPE OF AN OPEN-ENDED CYLINDER."
110 PRINT @256,"WHEN WE FIND THE AREA OF THE METAL USED FOR THE PI
PES WE ARE    FINDING THE LATERAL AREA OF A CYLINDER."
122 PRINT @579, "THE FORMULA FOR LATERAL AREA, (L), OF A CYLINDER
IS "
123 FOR N=1TO2000:NEXT
125 FOR N=1 TO 120
126 PRINT @720,"                              "
128 PRINT @720,"L = 2 X 3.14 X R X H"
130 NEXT
140 GOSUB6000
145 CLS
148 PRINT @257,CHR$(91);:PRINT @321,"H";:PRINT@385,CHR$(92);
150 PRINT @333, STRING$(12,CHR$(93));
155 PRINT @350,"LATERAL AREA";:PRINT @464, STRING$(3,CHR$(93));:PR
INT @47,"BASE";
156 PRINT @521,CHR$(91);
160 PRINT @582,"CYLINDER";
170 PRINT @720, "LATERAL AREA = 2 X 3.14 X R X H"
180 PRINT @840,"(REMEMBER R IS THE RADIUS OF THE CIRCULAR BASE.)"
200 SET(10,10):SET(15,9):SET(20,9):SET(25,9):SET(30,10)
210 FOR Y=12 TO 20:SET(10,Y):SET(30,Y):NEXT
220 SET(10,20):SET(15,19):SET(20,19):SET(25,19)
230 SET(15,22):SET(20,22):SET(25,22)
235 SET(11,21):SET(29,21)
240 FOR X=28 TO 100:SET(X,30):SET(X,37):NEXT
250 FOR Y=30 TO 37:SET(28,Y):SET(100,Y):NEXT
260 GOSUB6000
270 CLS
280 GOTO315
300 PRINT @70,"PLEASE USE THIS FORMULA TO DO THE NEXT 5 PROBLEMS.
                          L = 2 X 3.14 X R X H ":RETURN
315 GOSUB300
320 S=1:    PRINT @347,"PROB #1"
330 R=RND(10):H=RND(20):PRINT @ 512, "FIND THE LATERAL AREA OF A C
YLINDER IF THE RADIUS IS"R" AND THE HEIGHT IS "H;:INPUT K$
```

```
335 C=2*3.14*R*H:C1=INT(100*C+.5)/100
337 GOSUB7000
345 CLS
350 GOSUB300
360 S=2:PRINT @347,"PROB #2"
370 R=RND(20):H=RND(200):PRINT @512,"FIND THE LATERAL AREA OF A CY
LINDER IF THE RADIUS IS "R" AND THE HEIGHT IS"H;:INPUT K$
375 C=2*3.14*R*H:C1=INT(100*C+.5)/100
380 GOSUB 7000
400 CLS
410 GOSUB 300
430 S=3:PRINT @347, "PROB #3"
440 R=(RND(20)+10)/10:H=(RND(40)+1000)/100:PRINT@512,"FIND THE LAT
ERAL AREA OF A CYLINDER IF THE RADIUS IS"R"AND THE HEIGHT IS"H;:IN
PUT K$
450 C=2*3.14*R*H:C1=INT(100*C+.5)/100
455 GOSUB7000
465 CLS
470 GOSUB300
480 S=4:PRINT @347,"PROB #4"
490 A=RND(100)+200:R=RND(20):PRINT@512,"FIND THE HEIGHT OF A CYLIN
DER IF THE LATERAL AREA IS"A"AND THE RADIUS IS"R;:INPUT K$
500 C=A/(2*3.14*R):C1=INT(100*C+.5)/100
510 GOSUB 7000
525 CLS
530 GOSUB 300
540 S=5:PRINT@347,"PROB #5"
550 A=RND(100)+200:H=RND(30)+10:PRINT@512,"FIND THE RADIUS OF A CY
LINDER IF THE LATERAL AREA IS"A"AND THE HEIGHT IS"H;:INPUT K$
560 C=A/(2*3.14*H):C1=INT(100*C+.5)/100
570 GOSUB 7000
585 CLS
600 PRINT@64,"SOMETIMES WE MAY WISH TO FIND THE TOTAL SURFACE AREA
 OF A        CYLINDER."
610 PRINT @256, "TO THE LATERAL AREA, WE MUST ADD THE AREA OF THE
TWO BASES,       WHICH ARE CIRCULAR.
620 PRINT @512,"SO THE FORMULA FOR THE TOTAL SURFACE AREA (S) OF A
 CYLINDER IS  THE FOLLOWING:"
640 PRINT@713,"S = (2 X 3.14 X R X H)  +  (2 X 3.14 X R X R)"
645 FOR N=777 TO 822 STEP2:PRINT @N,CHR$(91):NEXT
650 GOSUB6000
655 CLS
660 GOSUB 7010
665 S=6:PRINT@347,"PROB #1"
668 R=RND(10):H=RND(20):PRINT@512,"FIND THE TOTAL SURFACE AREA OF
A CYLINDER IF THE RADIUS IS"R"   AND THE HEIGHT IS"H;:INPUTK$
670 C=(2*3.14*R*H)+(2*3.14*R*R):C1=INT(100*C+.5)/100
673 GOSUB7000
680 CLS
685 GOSUB7010
710 CLS
720 S=7:PRINT@347, "PROB # 2"
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723 GOSUB 7010
725 R = RND(10) +10:H = RND(20) +10:PRINT@512, "FIND THE TOTAL SUR
FACE AREA OF A CYLINDER IF THE RADIUS IS"R"    AND THE HEIGHT IS"H
;:INPUT K$
730 C =(2*3.14*R*H) + (2*3.14*R*R):Cl = INT(100*C+.5)/100
735 GOSUB 7000
750 CLS
770 GOSUB 7010
780 S=8:PRINT@347,  "PROB # 3"
785 R =(RND(20)+10)/10:H=(RND(40)+1000)/100:PRINT@512,"FIND THE TO
TAL SURFACE AREA OF A CYLINDER IF THE RADIUS IS"R"    AND THE HEIG
HT IS"H;:INPUT K$
790 C =(2*3.14*R*H)+(2*3.14*R*R):Cl = INT(100*C+.5)/100
795 GOSUB 7000
810 CLS
815 GOSUB 7010
820 S=9:PRINT@ 347, "PROB # 4"
830 S = RND(1000)+200:R = RND(10):PRINT@512, "FIND THE HEIGHT OF A
 CYLINDER IF THE TOTAL SURFACE AREA IS"S"    AND THE RADIUS IS "R;
:INPUT K$
835 C =(S-2*3.14*R*R)/(2*3.14*R):Cl=INT(100*C+.5)/100
890 GOSUB 7000
900 CLS
910 GOSUB 7010
915 S=10:PRINT@ 347,"PROB # 5"
920 S = RND(1000)+200:R =RND(10):PRINT@512,"FIND THE HEIGHT OF A C
YLINDER IF THE TOTAL SURFACE AREA IS"S"     AND THE RADIUS IS"R;:I
NPUT K$
925 C = (S -2*3.14*R*R)/(2*3.14*R):Cl = INT(100*C+.5)/100
930 GOSUB 7000
950 CLS
960 PRINT@512,A$",  YOUR SCORE FOR BOTH SECTIONS IS "T/10*100  " %
.  MAKE SURE YOUR                    TEACHER RECORDS THIS GRADE BEFORE
YOU CONTINUE."
970 GOSUB 6000
4000 CLS:T=O
4010 PRINT@30, "MENU"
4020 PRINT@275, "1";TAB(25); "AUTOMOTIVE"
4030 PRINT@339, "2";TAB(25); "BEAUTY CULTURE"
4040 PRINT@403, "3";TAB(25); "CLIMATE CONTROL"
4050 PRINT@467, "4";TAB(25); "ELECTRICAL"
4060 PRINT@531, "5";TAB(25); "MED. DENT.TECH."
4070 PRINT@595, "6";TAB(25); "REC. VECHICLES"
4080 PRINT@659, "7";TAB(25); "BUILDING TRADES"
4090 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
4095 CLS:ON Q GOTO 8000,8030,8060,8090,9020,9050,9080
5000 FOR N = 1 TO 1000:NEXT:RETURN
5999 END
6000 PRINT@ 960, "PRESS C TO CONTINUE."
6001 I$=INKEY$:IFI$="C" THEN RETURN
6002 IF I$="S" THEN GOSUB 7050
6003 IF I$="S" PRINT"ENTER C TO CONTINUE OR M TO GO ON TO MENU":IN
PUT SD$:IF SD$="C" RETURN ELSE GOTO 4000
6005 GOTO 6001
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7000 IF INT(VAL(K$))=INT(Cl) THEN PRINT @640, A$", THAT'S CORRECT.
":T=T+l:GOSUB 6000:ELSE PRINT @640,"SORRY "A$", THE CORRECT ANSWER
 IS "Cl:GOSUB 6000:RETURN
7001 CLS: RETURN
7010 PRINT @68, "PLEASE USE THE FOLLOWING FORMULA TO DO THE NEXT P
ROBLEM.              S = 2 X 3.14 X R X H + 2 X 3.14 X R X R"
7011 RETURN
7020 PRINT@68," PLEASE USE THE FOLLOWING FORMULA FOR THIS PROBLEM.
                                   A=2*3.14*R*H
7021 RETURN
7050 CLS:PRINT"YOU GOT"T"OUT OF"S" CORRECT FOR A SCORE OF"(T/S)*10
0"%":RETURN
7060 S=S+l:INPUTK$:IF FG=2 Cl=(2*3.14*R*L)+(2*3.14*R*R):ELSECl=(2*
3.14*R*L):RETURN
7061 RETURN
8000 FG=2:GOSUB 7010:R=RND(5)+5:L=RND(7)+10:PRINT@256,"A CUSTOMER
NEEDS A CYLINDRICAL COVER FOR HIS HEADREST.":PRINT@320,"THE HEADRE
ST HAS A RADIUS OF"R"AND A LENGTH OF"L:PRINT@384,"HOW MANY SQ. INC
HES ARE NEEDED.":GOSUB7060:GOSUB 7000:CLS
8005 FG=2:GOSUB 7010:R=RND(5)+5:L=RND(5)+5:PRINT@256,"A CYLINDRICA
L GASTANK HAS A RADIUS OF"R"FEET AND A LENGTH OF":PRINT@320,L"FEET
. HOW MANY SQUARE FEET OF COVERING WILL BE NEEDED FOR IT ";:GOSUB7
060:GOSUB7000:CLS
8010 FG=3:GOSUB 7020:R=RND(3)+3:L=RND(8)+8:PRINT@256,"A WATER PIPE
 HAS A RADIUS OF"R"AND A LENGTH OF"L". WHAT IS THE":PRINT@320,"LAT
ERAL AREA OF THIS PIPE.";:GOSUB 7060:GOSUB 7000:CLS:GOSUB 10500
8030 FG=3:GOSUB 7020:R=RND(3):L=RND(2)+1:PRINT@256,"A ROLLER HAS A
 RADIUS OF"R"AND A HEIGHT OF"L". WHAT IS ITS TOTAL":PRINT@320,"LAT
ERAL AREA.";:GOSUB 7060:GOSUB7000:CLS
8035 FG=3:GOSUB 7020:R=RND(2)+1:L=RND(4)+8:PRINT@256,"A CAN OF HAI
R SPRAY HAS A RADIUS OF"R" AND A LENGTH OF"L". WHAT":PRINT@320,"IS
 THE LATERAL AREA OF THE LABEL OF THE CAN.";:GOSUB 7060:GOSUB 7000
:CLS
8040 FG=2:GOSUB 7010:R=RND(3)+3:L=RND(5)+5:PRINT@256, "WE ARE REPL
ACING THE HEADREST ON OUR SHAMPOO CHAIR. IF IT HAS":PRINT@320,"A R
ADIUS OF"R " AND A LENGTH OF"L", HOW MANY SQ. IN. OF COVERING":PRI
NT@384,"ARE NEEDED FOR EACH HEADREST";
8041 GOSUB7060:GOSUB7000:CLS:GOSUB 10500
8060 FG=3:GOSUB7020:R=RND(2):L=RND(10)+40:PRINT@256,"YOU ARE ASKED
 TO INSULATE WATER PIPING. THE PIPING HAS A RADIUS":PRINT@320,"OF"
R"AND A LENGTH OF"L".HOW MANY SQUARE FEET OF INSULATION ARE":PRINT
@384,"NEEDED";:GOSUB7060:GOSUB7000:CLS
8070 FG=2:GOSUB7010:R=RND(3)+2:L=RND(3)+7:PRINT@256,"A CYLINDRICAL
 COOLING TANK HAS A RADIUS OF"R"AND A LENGTH OF"L:PRINT@320,"HOW M
ANY SQUARE FEET OF COPPER COVERING ARE NEEDED TO COVER IT";:GOSUB7
060:GOSUB7000:CLS
8080 FG=3:GOSUB7020:R=RND(3)+6:L=RND(7)+25:PRINT@256,"A WATER PIPE
 HAS A RADIUS OF"R"AND A LENGTH OF"L". WHAT IS ITS":PRINT@320,"LAT
ERAL AREA";:GOSUB7060:GOSUB7000:CLS:GOSUB 10500
8090 FG=2:GOSUB7010:R=RND(3)+3:L=RND(10)+10:PRINT@256,"A CYLINDRIC
AL ELECTRIC TRANSFORMER NEEDS TO BE RECOVERED. WHAT":PRINT@320,"IS
 ITS SURFACE AREA IF IT HAS A RADIUS OF"R"AND A LENGTH OF"L;:GOSUB
7060:GOSUB7000:CLS
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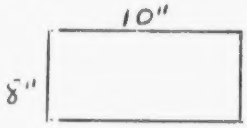
9000 FG=3:GOSUB7020:R=RND(2):L=RND(6)+6:PRINT@256,"HOW MANY SQUARE
 FEET OF WIRE ARE THERE IN ONE LAYER ON A SPOOL":PRINT@320,"THAT H
AS A RADIUS OF"R"AND A LENGTH OF"L;:GOSUB7060:GOSUB7000:CLS
9010 FG=3:GOSUB7020:R=RND(2)+RND(2):L=RND(6)+3:PRINT@256,"HOW MANY
 SQUARE FEET OF MATERIAL WILL BE NEEDE TO RESURFACE THE":PRINT@320
,"LATERAL ARE OF A NUCLEAR TRANSFORMER THAT HAS A RADIUS OF"R"AND"
:PRINT@384,"A LENGTH OF"L;:GOSUB7060:GOSUB7000
9011 CLS:GOSUB 10500
9020 FG=3:GOSUB7020:R=RND(2):L=RND(5)+3:PRINT@256,"HOW MANY SQUARE
 CM. OF PLASTIC ARE ON A SYRINGE WITH A RADIUS ":PRINT@320,"OF"R"A
ND A LENGTH OF"L;:GOSUB7060:GOSUB7000:CLS
9030 FG=3:GOSUB7020:R=1:L=RND(3)+2:PRINT@256,"HOW MANY SQ. IN. OF
GLASS MAKE UP A TEST TUBE WITH A RADIUS OF":PRINT@320,R"AND A LENG
TH OF"L;:GOSUB7060:GOSUB7000:CLS
9040 FG=2:GOSUB7010:R=RND(3)+2:L=RND(5)+5:PRINT@256,"WHAT IS THE S
URFACE AREA OF A HEADREST ON A DENTISTS CHAIR IF":PRINT@320,"ITS R
ADIUS IS"R"AND ITS LENGTH IS"L;:GOSUB7060:GOSUB7000:CLS:GOSUB 1050
0
9050 FG=3:GOSUB 7020:R=RND(2)+2:L=RND(12)+60:PRINT@256,"HOW MANY S
Q. IN. ARE NEEDED TO COVER A ROLL BAR ON A JEEP IF ":PRINT@320,"IT
S RADIUS IS"R"AND ITS LENGTH IS"L;:GOSUB7060:GOSUB7000:CLS
9060 FG=2:GOSUB7010:R=RND(3)+6:L=RND(10)+5:PRINT@256,"HOW MANY SQ.
 IN. OF METAL ARE NEEDED TO CONSTUCT A GAS TANK WITH":PRINT@320,"A
 RADIUS OF"R"AND A LENGTH OF"L;:GOSUB7060:GOSUB7000:CLS
9070 FG=2:GOSUB7010:R=RND(5)+5:L=RND(20)+20:PRINT@256,"YOU NEED TO
 RECOVER A HEADREST IN A GLIDER WITH A RADIUS OF"R:PRINT@320,"AND
A LENGTH OF"L". HOW MANY SQ. CM. OF LEATHER ARE NEEDED";:GOSUB7060
:GOSUB7000:CLS:GOSUB 10500
9080 FG=3:GOSUB7020:R=RND(2)+4:L=RND(2)+3:PRINT@256,"HOW MANY SQ.
FT. OF REDWOOD ARE NEEDED TO COVER THE INSIDE OF":PRINT@320,"A HOT
TUB WITH A RADIUS OF"R"AND A HEIGHT OF"L;:GOSUB7060:GOSUB7000:CLS
9090 FG=3:GOSUB7020:R=RND(5)+5:L=RND(20)+20:PRINT@256,"HOW MANY SQ
. FT. OF INSULATION ARE NEEDED TO INSULATE A WATER":PRINT@320,"PIP
E WITH A RADIUS OF"R"AND A LENGTH OF"L;:GOSUB7060:GOSUB7000:CLS
10000 FG=2:GOSUB7010:R=RND(2)+1:L=RND(3)+2:PRINT@256,"HOW MANY SQ.
 FT. OF WHITE OAK ARE NEEDED TO CONSTRUCT A WINE":PRINT@320,"BARRE
L WITH A RADIUS OF"R"AND A LENGTH OF"L;:GOSUB7060:GOSUB7000:CLS
10500 PRINT@384, A$", YOUR SCORE ON THE VOCATIONAL QUESTIONS IS"(T
/3)*100" %"
10505 GOSUB 6000
10510 CLS:PRINT@384, "IT HAS BEEN A PLEASURE SERVING YOU, "A$
10515 GOTO 10515
```

LATERAL AREA AND TOTAL SURFACE AREA

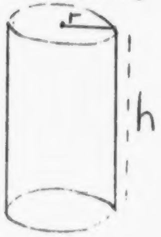
Peer Tutoring Reference Guide

Let us begin by examining a cylindrical can. An oil can that has an aluminum wrapping could be used. The can has three surfaces. One surface is curved and the other two are flat. If we carefully removed the wrapping from the can and laid if out flat, we would find that the wrapping is in the shape of a rectangle.



The area of this rectangle is called Lateral Area.

Of course, it is not always possible to change the curved surface into a flat or rectangular surface. Therefore, the following formula has been derived:



$2\pi rh$ ($\pi = 3.14$)

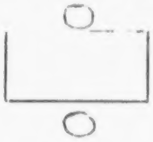
Example: If the radius 3 cm and the height is 10 cm

$2 \times 3.14 \times 3 \times 10$

188.4 sq cm

Sometimes there is a need to know not only the lateral area (the area of the rectangle), but also the total surface area. That is the area of the rectangle plus the two circular units. This is done as follows:

Lateral Area + 2 (area of circle)



The formula for lateral area is: $2\pi rh$

The formula for the area of one circle is: πr^2

The area of two circles with the same radius would be: $2\pi r^2$

We said earlier that the total surface area is

Lateral Area + 2 (area of circle)

or

$$2\pi rh + 2\pi r^2$$

or

$$2\pi r(h+r)$$

LATERAL AREA AND TOTAL SURFACE AREA

Peer Tutoring Reference Guide, continued

Example: the radius is 7" and the height is 10"

(π = 3.14)

2 x 3.14 x 7 (10 + 7)

or

2 x 3.14 x 7 (17)

or

3.14 x 14 x 17

or

3.14 x 238

or

747.32 square inches

LATERAL AREA AND TOTAL SURFACE AREA

Worksheet

Find the lateral area of each; use the following formula:

$2\pi rh$ = lateral area ($\pi = 3.14$)

1. Radius = 8 cm
   Height = 10 cm

   Lateral Area = _______ sq cm

2. Radius = 8 cm
   Height = 10 cm

   Lateral Area = _______ sq cm

3. Radius = 3 m
   Height = 8 m

   Lateral Area = _______

4. Radius = 4 dm
   Height = 6 dm

   Lateral Area = _______

Use the lateral area formula to solve for the missing value.

5. Radius = x m
   Height = 20 m
   Lateral Area = 1.2 m^2

   Radius = _______

6. Radius = 4 cm
   Height = x cm
   Lateral Area = 125.6 cm^2

   Height = _______

7. Radius = x m
   Height = 20 m
   Lateral Area = 2989 m^2

   Radius = _______

8. Radius = 5 mm
   Height = 4 mm
   Lateral Area = x mm^2

   Lateral Area = _______

Use the total area surface formula to find the following:

Total Area Surface = $2\pi rh + 2\pi r^2$ ($\pi = 3.14$)

9. Radius = 5 m
   Height = 7 m
   Total Surface Area = _____ m^2

10. Radius = 1 cm
    Height = 7 cm
    Total Surface Area = _____ sq cm

11. Radius = 4 cm
    Height = 5 cm
    Total Surface Area = _____

12. Radius = 2 cm
    Height = 10 cm
    Total Surface Area = _____

Worksheet, continued

Use the total area surface formula to solve for the missing values

$$\text{Total surface area} = 2\pi rh + 2\pi r^2$$

13. Radius = 3 m
Height = x m
Total Surface Area = 4,072 sq cm

14. Radius = 1 ft
Height = x ft
Total Surface Area = 256 sq ft

LATERAL AREA AND TOTAL SURFACE AREA

Application Problems

This worksheet will enable you to see some practical vocational applications using lateral and total surface area problems. Not all of these problems relate to your particular area of vocational education. They will, however, aid in strengthening your ability to use Lateral and Total Surface Area problems.

1. A silver pipe has a radius of 6" or .5 ft. and a length of 27 feet. If we wish to resurface this pipe, how many square feet of material is needed.

   $LA = 2\pi rh$

2. We are replacing the headrest on our shampoo chairs. If the headrest has a radius of 6" and a length of 14', how many square inches of material are needed to cover the total surface?

   $TS = 2\pi rh + 2\pi r^2$

3. A syringe has a radius of 8mm and a length of 20mm. How many square mm of plastic are used per syringe?

4. You want to recover the roll bar on a dune buggy. If the radius is 4" and the length is 60", how many square inches of material are needed?

5. A hot tub has a radius of 6' and a height of 5'. If we wish to line the sides with a redwood plyboard, how many square feet are needed?

   $LA = 2\pi rh$

6. You are building cylindrical wine barrels. If you want the radius of the barrel to be 3 feet and the height is 4 feet, how many square feet of lumber are needed?

   $TS = 2\pi rh + 2\pi r^2$

I. PROGRAM TITLE - "Tic Tac Toe"

II. PROGRAM DESCRIPTION
  A. Students will solve equations. They will use their answer to select a slot in a Tic Tac Toe game.
  B. One or two students may participate.
  C. This program is data based.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
  A. Peer Tutoring Reference Guide
  B. Worksheet on solving equations
  C. Application Word Problems
  D. Additional Sources
    1. Algebra I Computer Tapes, Radio Shack (26-1102)
    2. Mervin L. Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), Chapter 15, pp. 421-431.
    3. Hicks, Carl D., 40 Mathograms in Basic Algebra (Portland, Maine: J. Weston Walch, Publishers, Nos. 1, 2, 12, 14.

V. SKILLS NEEDED
All operations of whole numbers and decimal numbers.

```
1 '****************************************************************
*****
2 '************************** TIC TAC TOE *************************
*****
3 '************************* BY RICH ERIKSON **********************
*****
4 '******************* FRESHMAN , MANCHESTER H. S. ****************
*****
5 '************************ COMPLETED 3 / 80 **********************
*****
6 '****************************************************************
*****
7 DIMA$(15),A(15),B$(15),B(15)
8 FORN=1TO15:READB$(N),B(N):NEXTN:FOR N=1 TO15
9 X=RND(15)
10 IF B$(X)="0" GOTO 9
11 A$(N)=B$(X):A(N)=B(X)
12 B$(X)="0"
13 NEXT
19 CLS:L=0:Q=1:XO=0
20 GOSUB1000             'NAMES OF PLAYERS
30 GOSUB1035 'NUMBER SPACES
40 GOSUB1100             'GRID
50 GOSUB1108             'PLAYERS TURN
51 FORT=1TO200:NEXTT
55 GOTO 50
99 END
1000 INPUT"WHO IS GOING TO BE X";X$:CLS
1005 INPUT"WHO IS GOING TO BE O";O$:CLS
1010 RETURN
1035 N=0
1040 PRINT
1045 FOR K=1TO3
1050 FOR M=6TO46STEP20
1055 N=N+1
1060 PRINTTAB(M)N;
1065 NEXTM
1070 PRINT:PRINT:PRINT:PRINT:PRINT;
1075 NEXTK
1099 RETURN
1100 FORX=5TO125STEP40
1101 FORY=0TO36:SET(X,Y):NEXT
1102 NEXTX
1103 FORY=0TO36STEP12
1104 FORX=5TO125:SET(X,Y):NEXT
1105 NEXTY
1108 L=L+1:PRINT@832,"


             ";
1110 IF L/2 <> INT(L/2) THEN PRINT@832, X$"'S TURN ------";:ELSE P
RINT@832, O$"'S TURN ------";
```

```
1111 GOSUB5900
1120 IFVAL(K$)<>A(Q-1)THENRETURN
1135 XO=XO+1:IFX0=10THEN8000
1140 IFL/2=INT(L/2)THEN1302
1202 GOSUB 3500:INPUT AX:IFAX>9ORAX<1THEN1202
1203 IFM(INT((AX-1)/3)+1,AX-(INT((AX-1)/3)*3))<>0THEN1202
1205 ON AX GOSUB1210,1220,1230,1240,1250,1260,1270,1280,1290
1206 GOSUB2000:RETURN
1210 Y=0:GOSUB4900
1212 Y=0:GOSUB4905
1215 M(1,1)=1
1219 RETURN
1220 Y=0:GOSUB4910
1222 Y=0:GOSUB4915
1225 M(1,2)=1
1229 RETURN
1230 Y=0:GOSUB4920
1232 Y=0:GOSUB4925
1235 M(1,3)=1
1239 RETURN
1240 Y=12:GOSUB4900
1242 Y=12:GOSUB4905
1245 M(2,1)=1
1249 RETURN
1250 Y=12:GOSUB4910
1252 Y=12:GOSUB4915
1255 M(2,2)=1
1259 RETURN
1260 Y=12:GOSUB4920
1262 Y=12:GOSUB4925
1265 M(2,3)=1
1269 RETURN
1270 Y=24:GOSUB4900
1272 Y=24:GOSUB4905
1275 M(3,1)=1
1279 RETURN
1280 Y=24:GOSUB4910
1282 Y=24:GOSUB4915
1285 M(3,2)=1
1289 RETURN
1290 Y=24:GOSUB4920
1292 Y=24:GOSUB4925
1295 M(3,3)=1
1299 RETURN
1300 IFL<>2THEN1304
1302 GOSUB 3500:INPUTAO
1303 IFM(INT((AO-1)/3)+1,AO-(INT((AO-1)/3)*3))<>0THEN1302
1304 ON AO GOSUB1310,1320,1330,1340,1350,1360,1370,1380,1390
1306 GOSUB2000:RETURN
1310 Y=5:GOSUB5100
1311 Y=5:GOSUB5105
1315 M(1,1)=10
1319 RETURN
```

```
B1320 Y=5:GOSUB5110
1321 Y=5:GOSUB5115
1325 M(1,2)=10
1329 RETURN
1330 Y=5:GOSUB5120
1331 Y=5:GOSUB5125
1335 M(1,3)=10
1339 RETURN
1340 Y=17:GOSUB5100
1341 Y=17:GOSUB5105
1345 M(2,1)=10
1349 RETURN
1350 Y=17:GOSUB5110
1351 Y=17:GOSUB5115
1355 M(2,2)=10
1359 RETURN
1360 Y=17:GOSUB5120
1361 Y=17:GOSUB5125
1365 M(2,3)=10
1369 RETURN
1370 Y=29:GOSUB5100
1371 Y=29:GOSUB5105
1375 M(3,1)=10
1379 RETURN
1380 Y=29:GOSUB5110
1381 Y=29:GOSUB5115
1385 M(3,2)=10
1389 RETURN
1390 Y=29:GOSUB5120
1391 Y=29:GOSUB5125
1395 M(3,3)=10
1399 RETURN
2000 FORI=1TO3
2010 S(1)=S(1)+M(1,I)
2020 S(2)=S(2)+M(2,I)
2030 S(3)=S(3)+M(3,I)
2040 S(4)=S(4)+M(I,1)
2050 S(5)=S(5)+M(I,2)
2060 S(6)=S(6)+M(I,3)
2070 S(7)=S(7)+M(I,I)
2080 S(8)=S(8)+M(I,4-I)
2090 NEXTI
2100 FORR=1TO8
2110 IFS(R)=3THEN2500
2120 IFS(R)=30THEN3000
2130 S(R)=0:NEXTR:RETURN
2500 CLS:PRINT@330,X$" IS THE WINNER"
2510 GOTO3400
3000 CLS:PRINT@330,O$" IS THE WINNER"
3400 PRINT"DO YOU WANT TO PLAY AGAIN ( Y / N )":INPUTAA
3410 IF AA="Y"THENRUN
3415 IF AA="N"THENEND
3499 GOTO3400
3500 PRINT@896,"CORRECT, CHOOSE A SQUARE
  ";:RETURN
```

```
4900 FORX=8TO38:GOSUB5000
4901 NEXTX:RETURN
4905 FORX=38TO8STEP-1:GOSUB5000
4906 NEXTX:RETURN
4910 FORX=47TO77:GOSUB5000
4911 NEXTX:RETURN
4915 FORX=77TO47STEP-1:GOSUB5000
4916 NEXTX:RETURN
4920 FORX=86TO116:GOSUB5000
4921 NEXTX:RETURN
4925 FORX=116TO86STEP-1:GOSUB5000
4926 NEXTX:RETURN
5000 SET(X,Y):IF(X+1)/3=INT((X+1)/3)THENY=Y+1
5001 RETURN
5100 FORX=8TO38:GOSUB5130:NEXTX:RETURN
5105 FORX=38TO8STEP-1:GOSUB5130:NEXTX:RETURN
5110 FORX=47TO77:GOSUB5130:NEXTX:RETURN
5115 FORX=77TO47STEP-1:GOSUB5130:NEXTX:RETURN
5120 FORX=89TO119:GOSUB5130:NEXTX:RETURN
5125 FORX=119TO89STEP-1:GOSUB5130:NEXTX:RETURN
5130 GOSUB5000:GOSUB5500
5500 IFY=11THENY=1
5501 IFY=23THENY=13
5502 IFY=35THENY=25
5503 RETURN
5900 IFQ=10GOSUB7500
6000 PRINT@896,"YOU MUST SOLVE THIS EQUATION       ";A$(Q);:Q=Q+1:I
NPUTK$
6050 RETURN
7000 DATA X + 5 = 10,5,X - 4 = 16,20,2X = 12,6,X/4 = 8,32,2X + 3 =
 15,6,2X - 5 = 13,9,X/4 + 3 = 11,32,2X + 6 = 18,6,X/3 - 3 = 5,24,4
8/X + 4 = 10,8,13 + X = 19,6,15 - X = 7,8,X/6 = 7/2,21,5X - 3 = 27
,6,50 - 8X = 18,4
7500 RESTORE
7501 FORN=1TO15:READB$(N),B(N):NEXT
7502 FORN=1TO15
7503 X=RND(15):IFB$(X)="0"THEN7503
7504 A$(N)=B$(X):A(N)=B(X):B$(X)="0"
7505 NEXTN:Q=1
7506 RETURN
8000 PRINTCHR$(23),"GAME IS DRAW"
8005 GOTO3400
```

TIC TAC TOE

Peer Tutoring Reference Guide

SAMPLE I

$$x + 9 = 16$$

find s

By subtracting 9 from both sides of the equation, we can isolate x. Remember, equations are equal, and to keep them in balance, whatever is done to one side of the equation must be done to the other.

$$\begin{aligned} x + 9 &= 16 \\ -9 \quad & -9 \\ x \quad &= 7 \end{aligned}$$

Check your answer by replacing x with 7:

$$7 + 9 = 16$$

SAMPLE II

$$r - 14 = 31$$

find r

By adding 14 to both sides of the euqation (equal sign) we will isolate r.

$$\begin{aligned} r - 14 &= 31 \\ +14 \quad & +14 \\ r \quad &= 45 \end{aligned}$$

Check your answer by replacing r with 45:

$$45 - 14 = 31$$

SAMPLE III

$$9y = 36$$

find y

When we see 9y, this acutally says to us 9 times y. In order to isolate y, we must divide both sides of the equation by 9. We recall that any number divided by itself is 1

$$\frac{9y}{9} = \frac{36}{9}$$

$$y = 4$$

Check your answer by replacing y with 4

$$9 \times 4 = 36$$

SAMPLE IV

$$\frac{t}{3} = 12$$

By multiplying both sides of the equation by 3, we will isolate t. If we realize that $\frac{t}{3}$ is the same as $\frac{1}{3}$ t, we can see that the same rule applies for multiplication.

$$\frac{t}{3} = 12$$

$$3 \cdot \frac{t}{\cancel{3}} = 12 \cdot 3$$

$$t = 36$$

Check: $\frac{36}{3} = 12$

TIC TAC TOE

Worksheet

1. $4x = 36$

$x =$ ______

2. $2 + 6y = 26$

$y =$ ______

3. $7R - 4 = 45$

$R =$ ______

4. $\frac{t}{3} = 15$

$t =$ ______

5. $m + 10 = 40$

$m =$ ______

6. $3x = 42$

$x =$ ______

7. $4a + 2 = 30$

$a =$ ______

8. $b + 3 = 18$

$b =$ ______

9. $2r + 8 = 28$

$r =$ ______

10. $\frac{x}{4} = 36$

$x =$ ______

11. $2w + 9 = 21$

$w =$ ______

12. $4q - 4 = 12$

$q =$ ______

13. $7t = 98$

$t =$ ______

14. $\frac{2z}{3} = 16$

$z =$ ______

15. $4 + t = 10$

$t =$ ______

16. $2q + 9 = 18$

$q =$ ______

17. $8y = 96$

$y =$ ______

18. $\frac{9}{m} = 9$

$m =$ ______

19. $R + 8 = 21$

$R =$ ______

20. $5t = 25$

$t =$ ______

TIC TAC TOE

Application Word Problems

This worksheet will enable you to see some practical vocational applications using simple equations.

1. If 2 tires cost $140, what is the cost per tire?

$$2x = 140$$

2. In one year a client spends a total of $142 for 2 cold waves and 3 wash and sets. If the cold wave was $53, how much was each wash and set?

$$3x + 106 = 142$$

3. A food freezer is designed to operate at 8^{o}F. If it is running 10^{o} warmer than desired, what is the temperature it is running at?

$$8 + 10 = x$$

4. A child has 20 deciduous teeth and there are 4 equal quadrants. How many teeth are in each quadrant?

$$20 = 4x$$

5. A 90" plank of wood must be cut into 4 equal lengths. Find the length of each.

$$4x = 90$$

6. A spool of copper wire has 1,152 feet remaining on it. If this must be used equally on 3 jobs, how much is allowed for each job?

$$3x = 1,152$$

I. PROGRAM TITLE - "Volume I"

II. PROGRAM DESCRIPTION
  A. Students will view a brief tutorial section on finding the volume of a rectangular solid.
  B. Students will complete rectangular solid problems.
  C. Students will view a brief tutorial section on cylinders after which they will complete selected volume problems.
  D. Menu with area problems included.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
  A. Peer Tutoring Reference Guide
  B. Worksheets that will deal with volume of rectangular solids and cylinders
  C. Application Word Problems
  D. Additional Sources
    1. Eugene Nichold et al., Holt Geometry (New York: Holt, Rinehart, Winston, 1978), pp. 499-501.
    2. Foster, Cummins, Yunker, Merrill Geometry (Columbus, Ohio: Bell & Howell Co., 1981), Chapter 11.

V. SKILLS NEEDED

All operations of whole numbers, multiplication and division of decimals.

```
1 '**************************************************************
2 '**********           VOLUME     ONE             **************
3 '**********             WRITTEN BY                *************
4 '********** M.MC NEARNEY, M.MC ALISTER, J.DALY   **************
5 '********** FOR COMPUTER ASSISTED   VOC.  MATH   **************
6 '**********           OCTOBER    1980            **************
7 '**************************************************************
10 DIM V$(14)
20 FOR N = 1 TO 5:READ R$(N): NEXT
30 FOR N = 1 TO 14:READ V$(N): NEXT
100 CLS:PRINT@384, "PLEASE TYPE IN YOUR NAME";:INPUT A$
110 CLS
120 PRINT@400,"*******      PART 1     *******"
130 GOSUB6000
140 CLS:PRINT@400, "VOLUME OF RECTANGULAR SOLID"
150 GOSUB6000:CLS
160 GOSUB400
170 PRINT@718, "ABOVE YOU SEE A RECTANGULAR SOLID. "
175 GOSUB5000
180 PRINT@768, "NOTICE HOW THIS FIGURE APPEARS TO HAVE SPACE INSID
E OF IT!"
185 GOSUB5000
190 PRINT@832, "THE MEASURE OF THIS SPACE IS CALLED FINDING THE VO
LUME."
195 GOSUB5000
200 GOSUB6000:CLS
210 GOSUB400
220 PRINT@582, "FINDING VOLUME OF A RECTANGLE SOLID IS A SNAP!!!"
225 GOSUB5000
230 PRINT@704, A$ ", IT INVOLVES THE AREA OF THE BASE (WHICH IS A
RECTANGLE)"
235 GOSUB5000: PRINT@842, "AND THE NEW DIMENSION, HEIGHT."
240 GOSUB6000
250 CLS:GOSUB400
260 PRINT@590, "THE AREA OF THE BASE IS L X W."
270 GOSUB5000: PRINT@704, "IF YOU MULTIPLY THIS BY THE HEIGHT (H),
 YOU GET THE VOLUME!"
280 GOSUB5000:PRINT@846, "  V =  L * W * H "
290 GOSUB 6000
300 CLS:GOSUB400:PRINT@576, "IN THIS EXAMPLE, THE LENGTH IS 8 IN.,
 WIDTH IS 10 IN. AND HEIGHT IS 5 IN."
310 GOSUB5000:PRINT@704, "USING THE FORMULA V =L * W * H, WE GET 8
 IN. * 10 IN. * 5 IN."
320 GOSUB5000:PRINT@848,"THE VOLUME IS 400 CUBIC INCHES."
325 GOSUB6000:CLS
330 PRINT@384,"DO YOU WISH TO SEE THE LESSON AGAIN BEFORE TAKING T
HE QUIZ";:INPUTR$
340 IF R$="YES"THEN GOTO 110
350 CLS: PRINT@384,"HERE ARE 20 VOLUME PROBLEMS, "A$".  GOOD LUCK!
!"
360 GOSUB 6000
```

```
370 GOTO 1000
399 REM  ********** GRAPHIC OF RECTANGULAR SOLID **********
400 FORY=12TO23:SET(31,Y):NEXT:FORX=32TO76:SET(X,12):NEXT
401 SET(34,11):SET(34,22):SET(40,9):SET(37,10):SET(41,20):SET(43,8
):FORX=32TO76:SET(X,23):NEXT
402 SET(37,21):SET(46,8):SET(46,10):FORX=46TO90:SET(X,7):NEXT
403 FORY=14TO18:SET(46,Y):NEXT:FORX=50TO89STEP3:SET(X,18):NEXT
404 FORY=13TO22:SET(76,Y):NEXT:SET(79,11):SET(79,22):SET(82,10):SE
T(82,21):SET(85,9):SET(85,20):SET(88,8):SET(88,19):SET(44,19)
405 FORY=7TO18:SET(91,Y):NEXT:RETURN
700 REM ******* GRAPH OF THE CYLINDER *******
705 SET(25,13):SET(26,11):SET(25,15):SET(29,10):SET(29,16):SET(37,
10):SET(37,10):SET(37,16):SET(40,11):SET(40,15):SET(41,13):SET(77,
11):SET(77,15):SET(80,10):SET(80,16):SET(86,16):SET(87,10):SET(89,
11):SET(89,15):SET(91,13)
710 FORX=33TO83:SET(X,9):SET(X,17):NEXT:RETURN
1000 CLS:FORN=1TO20
1005 PRINT@110,"PROBLEM #"N
1010 L=RND(90):W=RND(9):H=RND(90)
1020 PRINT@390," FIND THE VOLUME OF THIS RECTANGULAR SOLID."
1025 PRINT@518," THE DIMENSIONS ARE"W"UNITS X"L"UNITS X"H"UNITS."
1030 PRINT@650," ";:INPUT "THE VOLUME ( IN CUBIC UNITS ) IS";V
1040 IFV=L*W*H THENPRINT@768,"CORRECT, "A$:C=C+1:ELSEPRINT@768,"TO
O BAD, "A$ ", THE CORRECT ANSWER IS"L*W*H"CUBIC UNITS."
1050 GOSUB6000
1055 CLS
1060 NEXT
1070 CLS: PRINT@390,"YOUR SCORE FOR THIS TEST WAS "(C/(N-1))*100 "
 %"
1075 PRINT@454," BE SURE TO HAVE THIS RECORDED, "A$",BEFORE GOING
ON."
1080 GOSUB6000
1085 CLS:PRINT@400, "****** PART 2 *****"
1100 GOSUB6000
1110 CLS:PRINT@200,"THERE ARE MANY OTHER SHAPES WE CAN FIND THE VO
LUME."
1120 GOSUB5000:PRINT@330,"ONE OF THE MOST COMMON IS THE CYLINDER!"
1130 GOSUB5000: PRINT@465,"LET'S TAKE A LOOK AT ONE!"
1140 GOSUB 6000
1150 CLS: GOSUB700
1160 GOSUB5000:PRINT@520," A CYLINDER IS A SOLID WITH A CIRCULAR B
ASE."
1170 GOSUB5000: PRINT@640," AS WE SAW BEFORE, THE FORMULA FOR VOLU
ME DEPENDS ON THE AREA"
1175 PRINT@704,"OF THE BASE, THEN MULTIPLIED BY THE HEIGHT OF THE
SOLID."
1180 GOSUB5000: PRINT@776," THE AREA OF A CICLE IS PI X RADIUS X R
ADIUS."
1185 PRINT@848," ( PI = 3.14  OR  3  1/7)"
1190 GOSUB6000:CLS
1200 GOSUB700: PRINT@520," THE FORMULA FOR THE VOLUME OF THE CYLIN
DER IS "
1210 GOSUB5000: PRINT@718, "V= PI X RADIUS X RADIUS X HEIGHT"
```

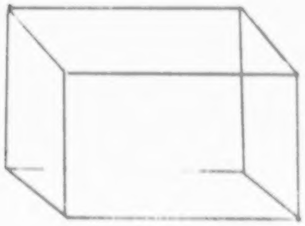
```
1220 GOSUB 5000: PRINT@530, "BE SURE TO WRITE THIS DOWN!!!!!"
1230 GOSUB6000:CLS:GOSUB700:PRINT@520," HERE IS AN EXAMPLE OF A VO
LUME OF CYLINDER PROBLEM."
1240 GOSUB5000: PRINT@640, "FIND THE VOLUME OF A CYLINDER WITH A R
ADIUS OF 3 AND A HEIGHT OF 10."
1250 GOSUB5000: PRINT@788," V= 3.14 X 3 X 3 X 10"
1260 GOSUB5000:PRINT@916," V  =  282.6  CUBIC UNITS":GOSUB5000
1270 GOSUB 6000:CLS:PRINT@400, A$ ", DO YOU WISH TO REVIEW CYLINDE
RS AGAIN";:INPUTP$
1280 IF P$ ="YES " THEN 1090
1290 CLS: PRINT@400,  A$", GET YOUR CYLINDER FORMULA READY !"
1300 PRINT@533," HERE COMES THE QUIZ!!!!!"
1310 GOSUB6000:CLS
1320 C=0:FOR N=1 TO 10
1330 PRINT@110,"PROBLEM # "N
1340 R= RND(20): H=RND(9)
1350 PRINT@400, " FIND THE VOLUME OF THIS CYLINDER."
1360 PRINT@518, " THE RADIUS IS "R" UNITS AND THE HEIGHT IS "H" UN
ITS."
1370 PRINT@650," ";:INPUT " THE VOLUME  (IN CUBIC UNITS) IS ";W:Z$
=STR$(W)
1380 K=INT(.008  +  (3.14 * R *R * H* 100)):K=K/100
1390 Y$= STR$(K)
1400 IF Z$ = Y$ THEN PRINT@768," CORRECT,"A$:C=C+1:ELSE PRINT@768,
" SORRY ABOUT THAT,"A$", THE ANSWER IS"Y$" CUBIC UNITS."
1405 GOSUB6000:CLS
1410 NEXT
1420 PRINT@390,  A$", YOUR SCORE FOR THIS TEST WAS "(C/(N-1))*100"
 % ."
1430 PRINT@454, "BE SURE TO HAVE THIS GRADE RECORDED BEFORE GOING
ON."
1440 GOSUB5000:GOSUB6000
4000 CLS
4001 CLS
4010 PRINT@30, "MENU"
4020 PRINT@275,"1";TAB(25);"AUTOMOTIVE"
4030 PRINT@339, "2";TAB(25);"BEAUTY CULTURE"
4040 PRINT@403, "3";TAB(25);"CLIMATE CONTROL"
4050 PRINT@467, "4";TAB(25);"ELECTRICAL"
4060 PRINT@531, "5";TAB(25);"MED. DENT.TECHNICIAN"
4070 PRINT@595,"6";TAB(25);"REC.VEHICLES"
4080 PRINT@659, "7";TAB(25);"BUILDING TRADES"
4090 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
4100 CLS
4110 PRINT@128, "IN THIS SECTION YOU WILL FIND VOLUMES OF ITEMS IN
 YOUR TRADE."
4115 GOSUB 5000
4120 PRINT@256, "IN ORDER TO DO WELL, TAKE DOWN THE FOLLOWING FORM
ULAS TO USE."
4130 PRINT@524,"VOLUME (RECTANGULAR SOLID) = L * W * H"
4135 GOSUB 5000
4140 PRINT@652, "VOLUME  (CYLINDER) = 3.14 * R * R * H"
```

```
4150 GOSUB 6000
4160 CLS
4165 L=RND(19)+1:W=RND(20)+2:H =RND(8)+2
4170 PRINT@128,"A RECTANGULAR "V$(Q)" MEASURES"L" BY"W" BY"H"."
4180 PRINT@256, "WHAT IS ITS VOLUME";:INPUT S
4190 GOSUB 9000
4195 GOSUB 6000
4200 CLS
4205 R = RND(10)+2:H=RND(5)+5
4210 PRINT@128, "A CYLINDRICAL "V$(Q+7)"'S RADIUS IS"R" AND HEIGHT
 IS"H"."
4220 PRINT@256, "WHAT IS ITS VOLUME";:INPUT T
4230 GOSUB 9010
4240 GOSUB 6000
4250 CLS
4260 L=RND(20)+2:W = RND(10)+5:V = RND(20)*L*W
4270 PRINT@128, "THE VOLUME OF A "V$(Q) " IS"V" CU. UNITS."
4280 PRINT@256, "IT'S LENGTH IS"L" AND ITS WIDTH IS"W"."
4290 PRINT@384, "WHAT IS ITS HEIGHT";:INPUT U
4300 GOSUB 9020
4310 GOSUB 6000
4320 GOSUB 10000
5000 FOR N = 1 TO 1500: NEXT:RETURN
6000 PRINT@960, "PRESS C TO CONTINUE"
6001 I$=INKEY$:IF I$="C"THEN RETURN ELSE 6001
8000 '*****************        DATA LINES      ******************
8005 DATA "TERRIFIC ANSWER!","SUPER WORK!","NICE GOING!","EXCELLEN
T!!!","LOVE IT!!!"
8010 DATA BATTERY CASE,MANICURE CASE,REFRIGERATION UNIT,FUSE BOX,F
ILE CABINET,TOOL BOX,DUMPSTER
8020 DATA TAIL PIPE,SHAMPOO DISPENSER,OIL TANK,HOT WATER HEATER,ME
DICINE BOTTLE,ROLL BAR,HOT TUB
9000 '**********************  MENU SCORING *********************
9005 V1=L*W*H:IFS =V1:L = RND(5):FOR NJ=1 TO 10:PRINT@843, "
                                 ":PRINT@853,R$(L):NEXT:C = C+1:ELSE
 PRINT@843, "SORRY, "A$", THE CORRECT ANSWER IS"V1
9006 RETURN
9010 V2=3.14*R*R*H:IF T = V2:L=RND(5):FOR NJ=1 TO 10:PRINT@843,"
                                            ":PRINT@853,R$(L):NEXT:C=
C+1:ELSE PRINT@843, "TOO BAD, THE CORRECT ANSWER IS"V2
9011 RETURN
9020 V3=V/(L*W):IF U=V3 :L=RND(5):FOR NJ=1 TO 10:PRINT@843, "
                              ":PRINT@853,R$(L):NEXT:C=C+1:ELSE PRI
NT@843, "WRONG, "A$". THE CORRECT HEIGHT IS"V3.
9021 RETURN
10000 '*************       FINAL ENDING  *********************
10010 CLS
10020 PRINT@384, "YOUR SCORE ON THIS SECTION IS"(C/3)*100" %"
10030 PRINT@512, A$ ", PLEASE GET THIS RECORDED BY YOUR TEACHER."
10040 PRINT@640, "IT WAS A PLEASURE WORKING WITH YOU ON THIS TOPIC
!"
10050 GOTO 10050
```

VOLUME I

Peer Tutoring Reference Guide

Volume of a Rectangular Solid



Above you see a rectangular solid. Notice how this figure appears to have space inside of it. The measure of this space is called its VOLUME.

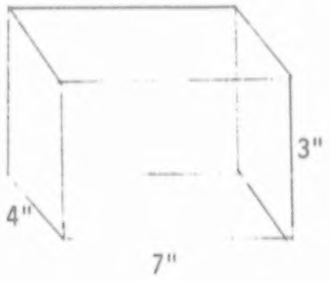
Finding the volume of a rectanglular solid is a snap. It involves the area of the base and the new dimension -- height.

As you may recall, the area of a rectangle is length x width. Since one dimension is added, it changes the formula slightly so that the volume equals the product of the length, width and height.

$$V = L \times W \times H$$

EXAMPLE I

Find the volume of the following rectangular solid



$V = L \times W \times H$

$V = 7" \times 4" \times 3"$

V = 84 cubic inches

A cylinder is a solid with circular bases. As we saw earlier, the formula for volume depends on the area of the base. For a circle, $A = r^2\pi$ (note $\pi \doteq 3.1416$). Once again, a new dimension is added.

And so, the formula for the volume of a cylinder is

$$V = r^2 \times h \times \pi$$

EXAMPLE II

Here, the radius of the cylinder base is 3 feet, and the height is 10 feet.

$$V = r^2 \times h \times \pi$$

$$V = 3^2 \times 10 \times \pi$$

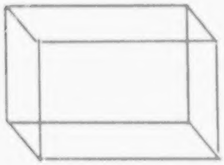
$$V = 9 \times 10 \times 3.1416$$

$$V = 282.744 \text{ cubic feet}$$

VOLUME I

Worksheet I - Finding the Volume of Rectangular Solids

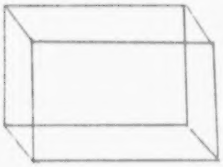
1.



l = 7'
w = 6'
h = 5'

V = ______

2.



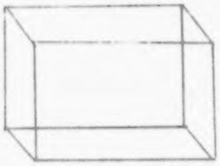
l = $2\frac{1}{4}$ ft.

w = $3\frac{1}{3}$ ft.

h = $7\frac{1}{2}$ ft.

V = ______

3.



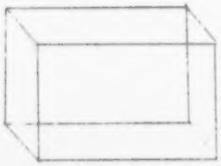
l = $2\frac{1}{3}$ ft.

w = $7\frac{1}{2}$ ft.

h = 10 ft.

V = ______

4.



l = 2.4"
w = 6.3"
h = 7.1"

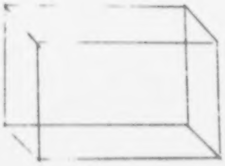
V = ______

5.

l = 9.1"
w = 8.2"
h = 7.1"

V = ______

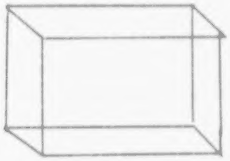
6.



l = 5.1
w = 6.3
h = 7.0

V = ______

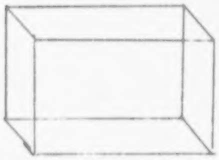
7.



l = 9.1"
w = .5"
h = 7.1"

V = ______

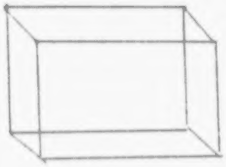
8.



l = 8.2"
w = 9.1"
h = 8"

V = ______

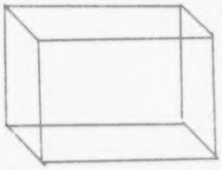
9.



l = 6 yd.
w = 12 yd.
h = 10 yd.

V = ______

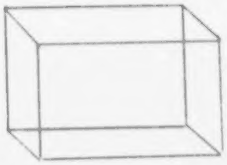
10.



l = 9"
w = 4"
h = 3"

V = ______

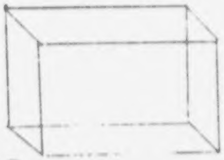
11.



l = 4'
w = 6'
h = ______

V = 46 cubic feet

12.



l = 1.2'
w = 6'
h = ______

V = 14.4 cubic feet

VOLUME I

Worksheet II - Finding the Volume of Each Cylinder

1.

r = 7'
h = 6'

V = _______

2.

r = 3"
h = 9"

V = _______

3.

r = 6'
h = 4.5'

V = _______

4.

r = 9"
h = 2.3"

V = _______

5.

r = 10"
h = 3.3"

V = _______

6.

r = 7"
h = 3"

V = _______

7.

r = 4"
h = 5"

V = _______

8.

r = 3"
h = 3.5"

V = _______

9.

r = 2"
h = 2½"

V = _______

10.

r = 5'
h = 5'

V = _______

11.

r = 2 feet
h = _______

V = 26 cubic feet

12.

r = r feet
h = _______

V = 169 cubic feet

Application Word Problems

1. A cylindrical oil tank has a radius of 18 feet and a height of 30 feet. What is its volume?

2. A cylindrical shampoo dispenser has a radius of 3.5 inches and a height of 18 inches. What is its volume?

3. A rectangular fuse box has a length of 16", a width of 20" and a height of 24". What is its volume?

4. A rectangular file cabinet has a length of 2¼', a width of 3' and a height of 5½'. What is its volume?

5. A cylindrical hot water tank has a radius of 2' and a height of 5.6 feet. What is its volume?

6. A rectangular refrigerator unit has a length of 12 feet and a width of 6½ feet. If its height is 4 1/3 feet, what is its volume?

7. A rectangular tool box has a length of 4½ feet, a width of 1 7/8 feet and a height of 2 1/3 feet. What is its volume?

8. Dr. Dolittle uses cylindrical medicine bottles. If their radius is 2 cm and the height is 6cm, what is the volume?

Application Word Problems, Continued

9. A rectangular dumpster has a volume of 120 cubic feet. What is the length of the dumpster is the height is 6 ft. and the width is 5 ft.?

10. A cylindrical water tank has a volume of 31,416,000 cubic feet. If the radius is 10 feet, what is the height?

I. PROGRAM TITLE - "Volume of Pyramid, Cone and Sphere"

II. PROGRAM DESCRIPTION

- A. Students will view tutorial on volume of the cone, pyramid, and sphere where formulas will be given.
- B. Students will be quizzed on each shape's volume using given formulas.
- C. Students will use various mathematical formulas to solve application problems.
- D. General test and vocational sections use random generation.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS

- A. Peer Tutoring Reference Guide
- B. Worksheet
- C. Application Word Problems
- D. Additional Sources
  - 1. Mervin L. Keedy et al., *General Mathematics* (Menlo Park, California: Addison Wesley, 1980), Chapter 7, pp. 350-352.
  - 2. Edwin I. Stein, *Stein's Refresher Mathematics*, 7th ed. (Boston: Allyn and Bacon, Inc., 1980), pp. 432-433.

V. SKILLS NEEDED

Addition and multiplication of wholes, fractions and decimals; use of exponents; basic algebraic skills in use of formulas.

```
1 CLEAR500
5 '************************************************************
6 '*********** VOLUME OF PYRAMID,CONE, AND SPHERE *************
7 '***********           WRITTEN BY               *************
8 '*********** J. DALY, M. MCALISTER, M. MCNEARNEY ************
10 ' ************ FOR COMP. ASSISTED VOC. MATH  ***************
11 ' ******************** FEBRUARY 1981 ***********************
12 '**********************************************************
13 DIM B$(21)
100 CLS
110 PRINT@384, " ";: INPUT "PLEASE TYPE IN YOUR NAME ";A$
120 CLS
130 PRINT@405, "****** PART 1 ******"
135 PRINT@533, "VOLUME OF THE CONE !"
140 GOSUB 6000
145 CLS
150 PRINT@64, "A  BASIC SHAPE WE DEAL WITH IN VARIOUS VOCATIONS IS
 THE CONE."
155 PRINT@269,STRING$(5,CHR$(95)):PRINT@399, CHR$(42):PRINT@460,"H
EIGHT":PRINT@527, CHR$(42):PRINT@589, STRING$(5,CHR$(95))
156 PRINT@295,STRING$(5,CHR$(42)):PRINT@300, "RADIUS":PRINT@284, S
TRING$(6, CHR$(95))
157 PRINT@704, "THE VOLUME OF THE CONE IS EXACTLY ONE-THIRD THE VO
LUME OF THE                       CYLINDER (PI X R X R X H)
160 PRINT@832,"THEREFORE, THE FORMULA IS
165 PRINT@908, "VOLUME OF A CONE = 1/3 X PI X R X R X H
180 X = 55:FOR Y=26 TO 14 STEP-1:SET(X,Y):X=X-1:NEXT
181 X = 55:FOR Y = 26 TO 14 STEP-1:SET(X,Y):X =X+1:NEXT:SET(55,16)
:SET(48,15):SET(61,15):SET(48,10):SET(61,10):SET(55,9):SET(45,12):
SET(64,12)
220 GOSUB 6000
225 CLS
230 PRINT@64, "LET'S DO A SAMPLE PROBLEM !!"
232 PRINT@204, "USE  V  =  1/3  X  PI X R  X  R  X  H"
235 FOR X =20 TO 108:SET(X,6):SET(X,12):NEXT:FOR Y=6 TO 12:SET(20,
Y):SET(108,Y):NEXT
240 PRINT@326, "WHAT IS THE VOLUME OF A CONE WITH A RADIUS OF 10 I
N. AND A                           HEIGHT OF 6 IN.?
246 FOR N= 1 TO 1000:NEXT
248 PRINT@580, "TAKE A MINUTE TO TRY IT, THEN PRESS 'C' TO SEE IT
DONE!"
250 GOSUB 6000
255 FOR N=1 TO 50:PRINT@640, "
            ":PRINT@640, "FIRST, REPLACE THE VARIABLES WITH THE VA
LUES---":NEXT
260 PRINT@783," V = 1/3 X 3.14 X 10 X 10 X 6"
270 PRINT@844, "THE VOLUME OF THE CONE IS 628 CU. IN.
299 GOSUB 6000
300 '*****************   CONE VOLUME QUIZ   ********************
310 CLS
```

```
320 T=0
330 FOR N = 1 TO 3
335 CLS
336 A = RND(4)*3:B = RND(20)
340      PRINT@75, "USE THIS FORMULA FOR THESE 5 PROBLEMS"
350     PRINT@210, "V = 1/3 X PI X R X R X H"
360       PRINT@274, STRING$(24,CHR$(95))
370      PRINT@410, "PROB. # "N
380    PRINT@512, "FIND THE VOLUME OF A CONE WITH A RADIUS OF"A" AN
D A HEIGHT OF"B
390  PRINT@580, " ";:INPUT "YOUR ANSWER ";D$
400    GOSUB 6500
410 GOSUB6000
415 NEXT
418 GOSUB 1000
419 '*************** VOLUME OF A PYRAMID *********************
420 CLS
425 PRINT@405, "****** PART 2 ******"
430 PRINT@533, "VOLUME OF A PYRAMID "
435 GOSUB 6000
440 CLS
445 PRINT@64, "SIMILAR TO THE CONE, THE VOLUME OF A PYRAMID IS A P
ART OF A LAR-GER SOLID.
448 FOR N= 1 TO1000:NEXT
450 PRINT@256, "IT'S VOLUME IS ONE THIRD OF THE VOLUME OF A RECTAN
GULAR SOLID.
453 FOR N= 1 TO 1500:NEXT
455 PRINT@384, "IN ORDER TO FIND THE VOLUME OF ANY PYRAMID, WE NEE
D
460 FOR N= 1 TO 1500:NEXT
463 FOR N= 1 TO 50:PRINT@525, "
"
465 PRINT@525, "1.  THE AREA (L X W) OF THE BASE"
466 NEXT
468 FOR N=1 TO 1000:NEXT
469 FOR N= 1 TO 50:PRINT@653, "
 "
470 PRINT@653, "2.  THE HEIGHT (H) OF THE PYRAMID"
472 NEXT
473 FOR N=1 TO 1000:NEXT
474 PRINT@768, "THE FORMULA IS"
475 FOR N= 1 TO 50: PRINT@850, "                                 "
:PRINT@850, "V = 1/3 * L * W * H"
476 NEXT:GOSUB 6000
478 '***************  PYRAMID VOLUME QUIZ  ******************
480 CLS
485 PRINT@395, "GET READY FOR THE PYRAMID QUIZ ON VOLUME !!!"
486 GOSUB 6000
490 CLS
495 FOR N = 6 TO 8
500    CLS
510    L = RND(20):W = RND(10)*3:H = RND(25)/5
```

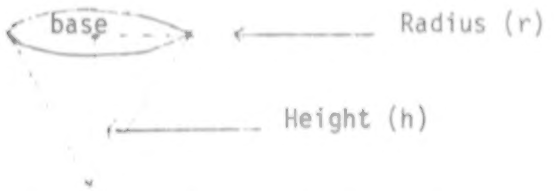
```
520   PRINT@75, "USE THIS FORMULA FOR THESE 3 PROBLEMS"
530   PRINT@213, "V = 1/3 * L * W * H"
535   PRINT@274, STRING$(24,CHR$(95))
540   PRINT@410, "PROB. # "N
550   PRINT@512, "FIND THE VOLUME OF A PYRAMID IF THE BASE MEASURE
S"L" BY"W" AND  THE HEIGHT IS"H
560   PRINT@644," ";:INPUT  "YOUR ANSWER ";G$
570 GOSUB 6700
580 GOSUB 6000
590 NEXT
595 CLS
600 '****************** VOLUME OF SPHERE ************************
610 PRINT@405,"***** PART 3 *****"
615 PRINT@534,"VOLUME OF SPHERE"
620 GOSUB 6000
625 CLS
630 PRINT@ 128, "THE SPHERE IS VERY INTERESTING AS IT HAS THE GREA
TEST VOLUME fORTHE AMOUNT OF IT'S SURFACE AREA.  tHIS IS THE MAIN
REASON THAT  SPHERICAL TANKS ARE COMMONLY USED TO STORE GAS AND WA
TER.
633 FOR N= 1 TO 1000:NEXT
635 FOR N=1 TO 50 :PRINT@400, "
":PRINT@400, "YOU NEED TO KNOW THE RADIUS !!":NEXT
640 FOR N=1 TO 1000:NEXT
645 PRINT@512, "THE VOLUME OF A SPHERE CAN BE FOUND BY USING THIS
FORMULA
650 FOR N=1 TO 1000:NEXT
655 FOR N= 1 TO 50:PRINT@658, "                                 ":PR
INT@658, "V = 4/3 * PI * R * R * R ":NEXT
660 FOR N= 1TO 1000:NEXT
665 PRINT@768, "BE SURE TO COPY THIS FORMULA BEFORE GOING ON TO TH
E QUIZ !!"
670 GOSUB 6000
675 CLS
680 '**************** QUIZ ON THE VOLUME OF SPHERE ************
682 FOR N = 9 TO 10
683 CLS
685      R = RND(10)
690      PRINT@75, "USE THIS FORMULA FOR THESE 2 PROBLEMS"
700     PRINT@210, "V = 4/3 * PI * R * R * R"
710     PRINT@274, STRING$(24,CHR$(95))
720     PRINT@410, "PROB. # "N
730     PRINT@512, "FIND THE VOLUME OF THE SPHERE THAT HAS A RADIUS
 OF"R
735   PRINT@580, " ";:INPUT "YOUR ANSWER";G1$
740     GOSUB 6800
750     GOSUB 6000
760 NEXT
765 GOTO 7000
999 GOSUB 6000
1000 CLS
```

```
1010 FOR N= 4 TO 5
1015 CLS
1020       PRINT@75, "USE THIS FORMULA FOR THESE 5 PROBLEMS"
1025    PRINT@210, "V = 1/3 * PI * R * R * H"
1040     PRINT @ 274, STRING$(24,CHR$(95))
1050     PRINT@410, "PROB. #" N
1060 A = RND(300)+300:B = (RND(3)*3):PRINT@512, "WHAT IS THE HEIGH
T OF A CONE IF IT'S VOLUME IS"A" CUBIC UNITS AND IT'S RADIUS IS"B
  "(ROUND OFF TO 100THS)
1070    PRINT@664, " ";:INPUT "YOUR ANSWER ";D$
1080 C = (3*A)/(B*B*3.14):C1 = INT(100*C+.5)/100
1085 GOSUB 6600
1090  GOSUB 6000
1105 NEXT
1111 GOTO419
2000 '************** FORMULAS TO KNOW BEFORE MENU ***************
2010 CLS
2020 PRINT@68, "COPY THESE DOWN BEFORE YOU BEGIN THE VOCATIONAL QU
ESTIONS. "
2030 PRINT@203, "VOLUME OF A CONE---- 1/3 * PI * R * R * H
2035 PRINT@264, STRING$(49,CHR$(42))
2050 PRINT@459, "VOLUME OF A PYRAMID ----1/3 * L * W * H
2055 PRINT@519, STRING$(50,CHR$(42))
2070 PRINT@715, "VOLUME OF A SPHERE ---- 4/3 * PI * R * r * r
2080 PRINT@775, STRING$(50,CHR$(42))
2090 PRINT@834, "READ QUESTIONS CAREFULLY TO SEE WHICH FORMULA YOU
 WISH TO USE."
2100 GOSUB 6000
4000 T=0: CLS
4010 PRINT@30, "MENU"
4020 PRINT@275, "1";TAB(25); "AUTOMOTIVE"
4030 PRINT@339, "2";TAB(25); "BEAUTY CULTURE"
4040 PRINT@403, "3";TAB(25); "CLIMATE CONTROL"
4050 PRINT@467, "4";TAB(25); "ELECTRICAL"
4060 PRINT@531, "5";TAB(25); "MED. DENT.TECH."
4070 PRINT@595, "6";TAB(25); "REC. VECHICLES"
4080 PRINT@659, "7";TAB(25); "BUILDING TRADES"
4090 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
4095 IF Q>7 THEN GOTO4090
4500 FOR N= 1 TO 21
4510     READB$(N)
4520 NEXT
4900 CLS
4910 T=0
5000 R = RND(5)+3:PRINT@128, "YOU ARE PREPARING FOR THE GRAND OPEN
ING OF":FOR N= 1 TO 50:PRINT@280, "                              ":
PRINT@280,B$(Q):NEXT:PRINT:PRINT "THERE WILL BE A GUESSING GAME WI
TH JELLY BEANS IN A BOWL.
5002 PRINT "THE BOWL IS SPHERICAL WITH A RADIUS OF"R
5004 INPUT "WHAT IS IT'S VOLUME";G1$
5006 GOSUB 6800
5008 GOSUB 6000
5010 CLS
```

```
5020 L=RND(30)*3:W=RND(30)+20:H=RND(30)+20:PRINT@64, B$(Q+7)" HAS
LOCATED IN FUTURETOWN.":PRINT "IN KEEPING WITH THE MODERN MOTIF, T
HEY DECIDED TO BUILD THEIR   OFFICE IN THE SHAPE OF A PYRAMID.  tH
E DIMENSIONS ARE"L "BY"W" WITH A HEIGHT OF"H".
5021 PRINT
5022 INPUT"WHAT IS IT'S VOLUME (CUBIC MEASURE)";G$
5024 GOSUB6700
5026 GOSUB 6000
5028 CLS
5030 A = RND(10)+8:B = RND(10)+12
5032 PRINT@64,"THE STORAGE AREA FOR "B$(Q+14):PRINT "IS A CYLINDRI
CAL BUILDING WITH A CONICAL ROOF.
5034 PRINT:PRINT "THE RADIUS OF THE CONE SHAPED ROOF IS"A;:PRINT "
 AND THE HEIGHT IS"B
5036 INPUT "WHAT IS THE VOLUME OF THE SPACE BENEATH THE ROOF";D$
5038 GOSUB 6500
5040 GOSUB 6000
5042 CLS
5044 PRINT@384, "YOUR SCORE IN THE VOCATIONAL AREA IS"(T/3)*100" %
":PRINT "   BE SURE TO SHOW THE TEACHER BEFORE GOING ON. "
5046 GOSUB 6000
5048 CLS
5050 PRINT@390, "SO LONG "A$".  SEE YOU LATER !!!"
5052 GOTO 5050
6000 PRINT@ 960, "PRESS C TO CONTINUE."
6001 I$=INKEY$:IFI$="C" THEN RETURN ELSE 6001
6500 K =(1/3*3.14*A*A*B):K1 =(100*K+.5)/100:IF INT(VAL(D$))=INT(K1
) THEN PRINT@704, "CORRECT, KEEP UP THE GOOD WORK !!!!":T = T+1:EL
SE PRINT@704, "WRONG, THE CORRECT ANSWER IS, "K1
6501 RETURN
6600 IF INT(VAL(D$)) = INT(C1) THEN PRINT@704, "YOU ARE SUPER, "A$
:T = T+1:ELSE PRINT@704, "SORRY, "A$, "THE ANSWER IS "C1
6601 RETURN
6700 P = 1/3*L*W*H:H1=INT((P+.005)*100)/100 :IF INT(VAL(G$))=INT(H
1)THEN PRINT@704, "YOU'RE THE BEST, "A$:T = T+1:RETURN:ELSE PRINT@
704, "SORRY, "A$", THE CORRECT ANSWER IS "H1:RETURN
6800 H =( 4* 3.14 * R*R*R)/3:H1=(100*H+.5)/100
6802 IF INT(VAL(G1$)) = INT(H1) THEN PRINT@704, "THAT'S TERRIFIC,
"A$:T = T+1:ELSE PRINT@704, "TOO BAD, "A$" ,THE CORRECT ANSWER IS"
H1
6804 RETURN
7000 CLS
7005 PRINT@384, A$", YOU HAVE SCORED A TOTAL OF"(T/10)*100" %  ON
THE THREE PARTS.   BE SURE TO HAVE THIS RECORDED."
7008 GOSUB 6000:GOTO2000
8000 DATA ARCHWAY AUTO,THE CLIP JOINT,CLIMATE CONTROL CO.,MR. SHOC
K'S ELECTRIC CO.,HEAL IT ASSOC.,BRICKTOWN VAN'S,RELIABLE CONSTRUCT
ION CO.
8100 DATA GOODWRENCH GARAGE,HAIRDO HEAVEN,FROSTY INC., 3M ELECTRIC
AL,BROAD STREET CLINIC,FLYER'S NEST,HOUSES FOR TOMORROW
8200 DATA FIX A DENT, CUTTING DEN,VALUE HEATING AND AIR CONDITIONI
NG, JONE'S ELECTRICAL SUPPLIES,PEDIATRICS PROFESSIONAL ASSOC., MAR
ITIME SUPPLY HOUSE, WOODHAVEN LUMBER
```

VOLUME OF PYRAMID, CONE AND SPHERE

Peer Tutoring Reference Guide



The cone is found very frequently in various vocations. Some examples are funnels and conical roofs. The volume of the cone is directly related to the volume of a cylinder. If a cone has the same base and height as a cylinder, its volume is one-third that of the cylinder's.

Therefore, the formula is

$$V = 1/3 \times \pi \times r \times r \times h$$

Let's do a sample problem using the formula above.

What is the volume of a cone with a radius of 10 in. and a height of 6 in.?

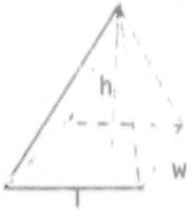
First, we replace the variables with the values given in the problem. ($\pi = 3.14$)

So,

$$V = 1/3 \times 3.14 \times 10 \times 10 \times 6$$

Second, perform all the computation indicated in the problem.

As you can see, the volume is 628 cu. in.



Another type of solid figure encountered is the pyramid. The pyramid's volume formula is related to the volume of a rectangular prism with the same length, width and height. Its relationship is once again similar to the cone's and cylinder's. It is 1/3 of the volume of the rectangular prism. Therefore, the formula is:

$$V = 1/3 \times l \times w \times h$$

Let's do a pyramid volume problem.

Find the volume of a pyramid with a rectangular base measuring 24 by 12 and a height of 20.

Again, substitute these values in the correct formula:

$$V = 1/3 \times 24 \times 12 \times 20$$

Be careful when computing!

The volume of the pyramid of these dimensions is 1,920 cubic units

The last solid figure being discussed in this unit is the sphere. The spherical shape is used very frequently for tanks because it has the greatest volume for the least amount of surface area.

The formula for finding the volume of a sphere is

$$V = 4/3 \times \pi \times R^3$$

OR

$$V = 4/3 \times 3.14 \times R \times R \times R$$

Find the volume of a sphere with a radius of 3".

Substituting our values in the formula gives us:

$$V = 4/3 \times 3.14 \times 3 \times 3 \times 3$$

Once again, we must calculate carefully and we get a volume of 123.04 cu. in.

Peer Tutoring Reference Guide

FACTS AND FORMULAS TO REMEMBER

The value of π = 3.14

Volume of Cone = 1/3 x π x r x r x h

Volume of Pyramid = 1/3 x l x w x h

Volume of Sphere = 4/3 x π x r x r x r

VOLUME OF PYRAMID, CONE AND SPHERE

Worksheet

A. Find the volume of each cone using the following formula:

$$V = 1/3 \times \pi \times r \times r \times h$$

and given these dimensions:

	RADIUS (r)	HEIGHT (h)
a)	3 cm	11 cm
b)	9 m	3 m
c)	6 in	10 in
d)	10 cm	51 cm
e)	20 mm	42 mm

B. Find the volume of each pyramid using the following formula:

$$V = 1/3 \times l \times w \times h$$

and given these dimensions:

	LENGTH (l)	WIDTH (w)	HEIGHT (h)
a)	15 cm	9 cm	10 cm
b)	21 cm	24 cm	30 cm
c)	3.3 mm	4.0 mm	9.5 mm
d)	6 in	8 in	12 in
e)	.45 m	.95 m	1.3 m

Worksheet, Continued

C. Find the volume of each sphere using the following formula:

$$V = 4/3 \times \pi \times r \times r \times r$$

and given these dimensions:

RADIUS (r)

a) 8 cm

b) 12 m

c) 1 mm

d) 3.6 m

e) 12 ft

VOLUME OF CONE, PYRAMID AND SPHERE

Application Problems

These problems will enable the student to see practical vocational applications using the volume formulas for the three figures. A variety of vocational problems will be presented and, although it may not be your field, each problem will enhance your skills in the use of volume formulas.

1. The base diameter of a cone-shaped countersink is 10.8 mm. The height of the countersink is 5.6 mm. Find the volume. (REMEMBER, we use radius!)

2. Attached to a camper is a tent addition. If it is in the shape of a square pyramid with a base side measuring 15' each, what is the volume of space inside?

3. In a medical lab, a conical container is used to allow slow dripping of a saline solution into a mixture. If the container has a radius of 2" and a height of 4", how many cu. inches of space does it enclose?

4. In making a cement mixture, a conical pile of sand is 2.5 m in diameter and 9 m high. How many cubic meters of sand are in the pile?

5. A light fixture is spherical in shape. If its diameter measures 18", what is its volume?

6. Central air conditioning is being installed in a new office building which is pyramid shaped. How many cubic feet of space needs cooling if the building measures 40 feet by 60 feet and has a height of 80 feet?

7. In a beauty parlor, there stands a water cooler. The cups used are cones with a base radius of 1½" and a height of 3". How much space is there per cup?

I. PROGRAM TITLE - "Simplifying and Evaluating Variable Expressions"

II. PROGRAM DESCRIPTION
   A. Students will view a brief tutorial section on simplifying expressions, evaluating expressions and exponents.
   B. Students will complete problems dealing with each of the following:
      1. simplifying expressions
      2. evaluating expressions
      3. squaring and cubing whole numbers
   C. All problems are randomly generated.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide
   B. Worksheets
      1. Simplifying Expressions
      2. Evaluating Expressions
      3. Squaring and Cubing Whole Numbers
   C. Application Word Problems
   D. Additional Sources
      1. Dolciani, Mary and William Wooton, Modern Algebra (Boston: Houghton Mifflin, 1979), pp. 36-42, 89-91.

V. SKILLS NEEDED
All operations using whole numbers and multiplication of decimals.

```
1 REM ********************************************************
5 REM **********      SIMPLIFYING  EXPRESSIONS     ***********
6 REM **********         USE  OF  EXPONENTS        ***********
7 REM **********      EVALUATING  EXPRESSIONS      ***********
8 REM **********      FOR COMP. ASS. VOC. MATH     ***********
9 REM **********         WRITTEN BY                ***********
10 REM ********* M. MCNEARNEY, J. DALY, M. MCALISTER *********
11 REM  ********************************************************
12 DIMS$(21):CLS:PRINT@448, " ";:INPUT "PLEASE TYPE IN YOUR NAME";
A$
14 CLS: PRINT@390, "SIMPLIFYING AND EVALUATING VARIABLE EXPRESSION
S"
16 GOSUB 6000
18 CLS: PRINT@75, A$ ", WELCOME TO THE WORLD OF ALGEBRA!"
20 FOR N=1 TO1000: NEXT
22 PRINT@202, "IN ALGEBRA, WE MUST LEARN ABOUT EXPRESSIONS."
24 FOR N=1 TO 500:NEXT
26 PRINT@340," 5 X + 3 X + 2 X "
28 FOR R = 1 TO 15: PRINT@404+R,CHR$(42):NEXT
30 PRINT@520,"WHAT YOU ARE LOOKING AT IS A VARIABLE EXPRESSION."
31 FOR N=1 TO 500:NEXT
32 PRINT@645, "IT HAS 3 TERMS 5 X, 3 X AND 2 X WHERE X IS THE VARI
ABLE."
33 FOR N=1 TO 500:NEXT
34 PRINT@775, "WHEN THE VARIABLE IS THE SAME, THE TERMS ARE SIMILA
R."
36 GOSUB6000
37 CLS
38 PRINT@69, "WHEN AN EXPRESSION HAS SIMILAR TERMS, THEY CAN BE CO
MBINED.":FOR N = 1 TO 500: NEXT
40 PRINT@197, "EXPRESSIONS LIKE    5 X + 3 X + 2 X    CAN BE THOUG
HT OF AS"
42 PRINT@345, "( 5 + 3 + 2 ) X":FOR N=1 TO 500: NEXT
43 PRINT@478, "OR":FOR N= 1 TO 500: NEXT
44 PRINT@605, "10 X"
45 PRINT@712, "LET'S DO AN EXAMPLE AND SEE HOW YOU DO, "A$
46 GOSUB 6000:CLS
48 CLS:PRINT@70, "SIMPLIFY THE EXPRESSION    9 X + 2 X + 11 X "
50 PRINT@198, " ";:INPUT " YOUR ANSWER PLEASE ";K$
52 IF VAL(K$) = 22 THEN PRINT@392, "THAT IS RIGHT, "A$".   GO ON T
O THE QUIZ!":ELSE PRINT@392, "WRONG!!!  THE CORRECT ANSWER IS (9 +
 2 + 11) X OR 22 X.                        BE CAREFUL !"
54 GOSUB 6000
56 CLS:PRINT@405, " ***  SECTION 1  *** "
97 GOSUB6000
98 CLS
99     FOR N=1TO10
100     A=RND(20):B=RND(30):C=RND(10)
110         D=RND(10)
120          PRINT @ 180, "PROB "N
125          PRINT @260, A"X +"B"X +"C"X ="
```

```
130          PRINT @388," ";: INPUT "YOUR ANSWER PLEASE";Q$
140          IF VAL(Q$)=A+B+C GOSUB 5000 :S=S+1:ELSE GOSUB 5500
142         PRINT@646, "EVALUATE FOR X = "D
143        PRINT@709, " ";:INPUT "YOUR ANSWER PLEASE";Q1$
144         IF VAL(Q1$)=A*D+B*D+C*D GOSUB 5000:S=S+1:ELSE GOSUB 560
0
150          GOSUB 6000
155          CLS
160    NEXT
170 CLS
180 PRINT@384, A$ ", THE SCORE FOR THIS SECTION IS "(S/20)*100 " %
"
190 FOR N=1 TO 1000: NEXT
200 PRINT@512, "BE SURE TO GET THIS RECORDED BEFORE GOING ON !!"
210 GOSUB 6000
220 CLS:PRINT@405, " *** SECTION 2 *** "
230 GOSUB 6000
299 CLS
300 FOR N = 1 TO 5
310     Y = RND(100): Z = RND(30)
320     PRINT@180, "PROB. # "N
330     PRINT@275, "SQUARE "Y"           CUBE " Z
340     PRINT@403," ";:INPUT Y1:GOSUB 4000
350    PRINT@424, " ";:INPUT Z1:GOSUB 4500
355  GOSUB 6000
357  CLS
360 NEXT
370  CLS
375  PRINT @384, A$ " ,THE SCORE FOR THIS SECTION IS "(S1/10)*100
"%"
380 GOSUB 6000
395 DATA 4 X 5 + 7,27,18/3 +36,42,3 + 4 x 6,27,(15/3)/5,1
396 DATA 21 - 6/3,19,60 - 8/2,56,8 X (7-4) + 11,35,(11 X (3 + 2))/
5,11
397 DATA 12 X 8 + (12 X 2),120,18/9 + (3 X 3),11
398 CLS:PRINT@405, " ***  SECTION 3  *** ":GOSUB 6000
399 CLS
400 FOR N=1 TO 10:READ A$(N),B(N):NEXT
410 FOR N = 1 TO 10
420      X =RND(10)
430      IF A$(X)="0" THEN 420
435     C$(N)=A$(X):D(N)=B(X)
440     A$(X)="0"
450 NEXT
460 FOR N = 1 TO 10
465     PRINT@180, "PROB. # "N
470 PRINT@256, "SIMPLIFY       " C$(N)
480     PRINT@403, "YOUR ANSWER, PLEASE";:INPUT F
490     IF F =D(N) THEN GOSUB 5000:S3 = S3 + 1:ELSE PRINT@536, "TH
E CORRECT ANSWER IS "D(N)
500     GOSUB 6000
510     CLS
```

```
 520 NEXT
530 CLS
540 PRINT@384, "yOUR SCORE FOR THIS QUIZ IS "(S3/10)*100 " %."
550 PRINT@512, "BE SURE TO HAVE THIS RECORDED BY YOUR TEACHER."
560 GOSUB 6000
570 CLS
580 GOTO8000
590 GOTO590
4000 IF Y1=Y*Y GOSUB 5000 :S1=S1+1:RETURN:ELSE PRINT @463, Y" X"Y"
 = "Y*Y;:RETURN
4500 IF Z1=Z*Z*Z GOSUB 5000 :S1=S1+1:RETURN: ELSE PRINT @483, Z" X
"Z" X"Z" = "Z*Z*Z:RETURN
5000   Y=RND(5)
5010   ON Y GOTO 5020,5030,5040,5050,5060
5020   A1$="GREAT !!!":GOTO 5070
5030   A1$="THAT'S INCREDIBLE!!":GOTO 5070
5040   A1$="WONDERFUL !!":GOTO 5070
5050  A1$="FABULOUS!!":GOTO 5070
5060 A1$="BY JOVE YOU'VE GOT IT":GOTO 5070
5070 FOR H=1 TO 100:PRINT @536,A1$:PRINT @536,"
  ";:NEXT:RETURN
5500 PRINT@453,"SORRY, "A$", tHE CORRECT ANSWER IS "A+B+C "X":RETU
RN
5600 PRINT@774, "SORRY, "A$", tHE CORRECT ANSWER IS "A*D+B*D+C*D:R
ETURN
6000 PRINT @854, "PRESS C TO CONTINUE"
6001 K$=INKEY$:IF K$="C" THEN RETURN ELSE 6001
8000 CLS
8010 PRINT@30,"MENU"
8020 PRINT@275, "1";TAB(25);"AUTOMOTIVE"
8030 PRINT@339, "2";TAB(25);"BEAUTY CULTURE"
8040 PRINT@403, "3";TAB(25);"CLIMATE CONTROL"
8050 PRINT@467, "4";TAB(25);"ELECTRICAL"
8060 PRINT@531, "5";TAB(25);"MED. DENT. TECH."
8070 PRINT@595, "6";TAB(25);"REC. VEHICLES"
8080 PRINT@659, "7";TAB(25);"BUILDING TRADES"
8090 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
8100 FOR Z=1 TO 21:READS$(Z):NEXT
8110 CLS:A=RND(10):B=RND(10):C=RND(10)
8120 PRINT@180, "PROBLEM #1"
8125 PRINT@384, "A " S$(Q)" IS DIVIDED INTO 3 PARTS.  THE FIRST IS
"A"X,"
8127 PRINT@468," THE SECOND IS"B"X,"
8129 PRINT@532," THE THIRD IS"C"X,"
8130 PRINT@576,"REPRESENT YOUR ANSWER IN TERMS OF X":INPUT K$
8135 IF VAL(K$)=A+B+C PRINT@704,"RIGHT ON":CT=CT+1:ELSE PRINT@704,
"SORRY, THE CORRECT ANSWER IS "A+B+C"X."
8140 GOSUB6000
8145 CLS:PRINT@180,"PROBLEM #2"
8147 A=RND(10)+10:B=RND(7):C=RND(5)
8150 PRINT@384,"A "S$(Q+7)" IS "A"X UNITS IN LENGTH."
```

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8152 PRINT@
468,"ONE PART IS"B"X UNITS LONG,"
8154 PRINT@532,"ANOTHER IS "C"X UNITS LONG,"
8156 PRINT@576,"REPRESENT THE THIRD LENGTH IN TERMS OF X.":INPUTK$
8158 IF VAL (K$)=A-B-C THEN PRINT@704,"GREAT WORK":CT=CT+1:ELSE PR
INT@704,"SORRY, THE CORRECT ANSWER IS,"A-B-C"X."
8160 GOSUB6000
8165 CLS:PRINT@180,"PROB#3"
8167 A=RND(10):B=RND(10)
8168 PRINT@384,"A RECTANGULAR "S$(Q+14)" HAS A LENGTH OF"A"X AND A
 WIDTH OF"B"X ."
8170 PRINT"WHAT IS ITS PERIMETER IN TERMS OF X";:INPUTK$
8172 IF VAL(K$)=2*A+2*B THEN PRINT@704, "YOU'RE NO TURKEY":CT=CT+1
:ELSE PRINT@704,"SORRY THE CORRECT ANSWER IS"2*A+2*B"."
8180 GOSUB6000
8190 CLS:PRINT @512, A$", YOUR SCORE FOR THIS SECTION IS "INT((CT/
3)*100)"%":PRINT"GOODBYE, AND HAVE A NICE DAY"
8195 GOTO8195
10000 DATA WRENCH, CURLING IRON,COMPRESSOR,WATT TESTER, DRILL,ANTE
NNA,LEVEL
10010 DATA TIRE IRON, BRUSH, RECEIVER-DRIER, SWITCH PLATE, X-RAY,
TIRE IRON, HAMMER
10020 DATA BATTERY, CURLER BOX, EVAPORATOR COVER,CONDUCTOR CASE, B
LOOD PRESSURE CASE,WATER TANK, TOOL BOX
```

SIMPLIFYING AND EVALUATING VARIABLE EXPRESSIONS

Peer Tutoring Reference Guide

Simplifying and evaluating variable expressions. In algebra we must learn about expressions.

This is an expression: $4x + 2x + 3x$

It has 3 terms: $4x$, $2x$, and $3x$ and x is the variable. When the variable is the same, the terms are similar.

Now it must be noted that when an expression has similar terms, they can be combined. So,

$4x + 2x + 3x$ can be thought of as $(4 + 2 + 3)\,x$ or

$$9\,x$$

EXAMPLE I

Simplify the expression:

$$9x + 2x + 5x$$

Again, the terms are similar, so

$$(9 + 2 + 5)\,x \quad \text{or} \quad 16x$$

Often we are asked to evaluate the variable expression. This process requires only one step after we have simplified the variable expression.

EXAMPLE II

Simplify the expression, then evaluate if $x = 5$

$$2\,x + 9\,x + 11\,x$$

$$(2 + 9 + 11)\,x$$

$$22\,x$$

Now evaluate:

if $x = 5$

$$22 \cdot (x)$$

OR $22 \cdot 5 = 110$

Squaring and Cubing Numbers

When we square a number, all that we do is multiply it by itself.

EXAMPLE II

5^2 or 5 squared

is

$5 \cdot 5$ or 25

EXAMPLE III

4^3

Here we are asked to cube 4 and so we must multiply the number by itself 3 times or

$4 \times 4 \times 4$

$14 \times 4 = 64$

So, $4^3 = 64$

EXAMPLE IV

The order of operation is needed in the final facet. of this program.

1. simplify the names of powers
2. then simplify the names of products and quotients in order from left to right
3. then simplify the names of sums and differences in order from left to right.*

*Taken from: Dolciani, Mary and William Wooton, Modern Algebra (Boston: Houghton Mifflin Company, 1979), Book 1, Structure and Method, p. 10.

SIMPLIFYING AND EVALUATING VARIABLE EXPRESSIONS

Worksheet I - Simplify each expression, then evaluate.

1. $2x + 5x + 7x =$ ________

evaluate if $x = 6$ ________

2. $7x + 9x + 3x =$ ________

evaluate if $x = 5$ ________

3. $4y + 2y + y =$ ________

evaluate if $y = 2$ ________

4. $7x + 10x + 3x =$ ________

evaluate if $x = 3$ ________

5. $3b + b + b =$ ________

evaluate if $b = 5$ ________

6. $7x + 2x + 3x =$ ________

evaluate if $x = 2.5$ ________

7. $9c + 9c + c =$ ________

evaluate if $c = 9$ ________

8. $7t + 2t + 2t =$ ________

evaluate if $t = .5$ ________

9. $9R + 3R + 5R =$ ________

evaluate if $R = 4$ ________

10. $2z + z + 2z =$ ________

evaluate if $z = 3$ ________

11. $2x + .5x + .5x =$ ________

evaluate if $x = 4$ ________

12. $x + .5x + .5x =$ ________

evaluate if $x = 2$ ________

13. $2c + 3c + c =$ ________

evaluate if $c = 5$ ________

14. $7x + 7x + 7x =$ ________

evaluate if $x = 7$ ________

15. $x + 3x + x =$ ________

evaluate if $x = 5$ ________

16. $9x + x + 2x =$ ________

evaluate if $x = 3$ ________

17. $9b + 2b + b =$ ________

evaluate if $b = 6$ ________

18. $7y + 4y + y =$ ________

evaluate if $y = 8$ ________

19. $2z + z + z + z =$ ________

evaluate if $z = 1$ ________

20. $2x + 3x + x =$ ________

evaluate if $x = .5$ ________

SIMPLIFYING AND EVALUATING VARIABLE EXPRESSIONS

Worksheet II - Squaring and Cubing Numbers

1. 6^2 ____ 6^3 ____
2. 7^2 ____ 7^3 ____
3. 8^2 ____ 8^3 ____
4. 4^2 ____ 4^3 ____
5. 1^2 ____ 1^3 ____
6. 9^2 ____ 9^3 ____
7. 10^2 ____ 10^3 ____
8. 2^2 ____ 2^3 ____
9. 3^2 ____ 3^3 ____
10. 11^2 ____ 11^3 ____
11. 5^2 ____ 5^3 ____
12. 12^2 ____ 12^3 ____

SIMPLIFYING AND EVALUATING VARIABLE EXPRESSIONS

Worksheet III - Order of Operations

1. 2 + 3 x 4

______

2. 7 x 3 + 4

______

3. 9 - 2 x 6

______

4. 48 ÷ 2 x 3

______

5. 12 · 6 + 2

______

6. 4 x 3 x 0 + 2

______

7. 9 · 5 + 2 · 5

______

8. 7 - 2 - 3

______

9. 10 x 12 ÷ 3

______

10. 40 ÷ 2 + 9

______

11. 6 + 5 x 4

______

12. 25 · 5 ÷ 5

______

13. 2^3 x 5 + 2

______

14. 6 x 5^2 + 1

______

15. 3^2 + 5 x 6

______

SIMPLIFYING AND EVALUATING VARIABLE EXPRESSIONS

Application Word Problems

1. The Blow-Out Tire Shop has

   6 F-14 tires in the lower case

   7 F-14 tires in the upper case

   5 F-14 tires outside.

   How many F-14 tires are there in total? ____________

   If each tire wholesales for $68, what is the total inventory worth?

2. Silkies Salon has 4 operators. One works 25 hours a week, another 40 hours a week, the third 30 hours a week and the fourth 10 hours a week. What is their total number of hours worked?

3. The sides of a rectangular switch plate are: length 2x
   width 4x

   What is the perimeter ($P = 2 \cdot \text{length} + 2 \cdot \text{width}$) ____________

   If $x = 6$ cm, evaluate ____________

4. The sides of a triangular pupillary distance scope are 3x, 4x and 5x.

   What is the perimeter ($P = a + b + c$) ____________

   If $x = 2$ inches, evaluate ____________

5. The lengths of a rectangular pool are 5x and 6x.

   What is its perimeter ($P = 2 \cdot \text{length} + 2 \cdot \text{width}$) ____________

   If $x = 3'$, evaluate ____________

Application Word Problems, Continued

6. A rectangular garage has a length of 8x and a width of 6x.

   What is the perimeter? ________________

   Evaluate if x = 4 feet ________________

7. A triangular light fixture has sides of 2x, 3x and 4x.

   Find its perimeter (P = a + b + c) ___________

   If x = 5", evaluate _____________

I. PROGRAM TITLE - "Solving Equations"

II. PROGRAM DESCRIPTION
- A. Students will view tutorial section. (refer to Peer Tutoring Reference Guide)
- B. Students, given an open sentence, will solve for the variable to make it a true statement.
- C. Students will use equations to solve various vocational application word problems.
- D. General Section uses Data lines.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
- A. Peer Tutoring Reference Guide
- B. Worksheet
- C. Application Word Problems
- D. Additional Sources
  1. Algebra I Computer Tapes, Radio Shack (26-1702)
  2. Mervin L. Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), Chapter 15 pp. 421-431.
  3. Carl D. Hicks, 40 Mathograms in Basic Algebra (Portland, Maine: J. Weston Walch, Publishers) Nos. 1, 2, 12, 14.

V. SKILLS NEEDED

Addition, subtraction, multiplication and division of whole numbers and decimals.

```
4 ' ********************************************************
5 ' *************      EQUATIONS                *******************
6 '  *************     WRITTEN  BY               *******************
7 '  *************     M. MCALISTER              *******************
8 '  *************     M. MCNEARNEY              *******************
9 '  *************          FOR                  *******************
10 ' *************   COMPUTER ASSISTED            *******************
11 ' *************       VOC MATH                 *******************
12 ' *******************************************************
13 DIM A$(20),B(20),C$(20),D(20)
14 CLS
20 PRINT@384, " ";:INPUT "PLEASE TYPE IN YOUR NAME ";A$
90 CLS
95 PRINT@395, "*****   SOLVING SIMPLE EQUATIONS   *****"
97 GOSUB 6000
99 CLS
100 PRINT@64, "YOU WILL BE FACED WITH SOLVING SIMPLE EQUATIONS, SU
CH AS
102 PRINT@212, "X  +  9  =  16
104 FOR N = 1 TO 1000: NEXT
106 PRINT@276, "X  -  11  =  30
108 FOR N= 1 TO 1000: NEXT
110 PRINT@340, "5 X  =  45
112 FOR N= 1 TO 1000: NEXT
114 PRINT@404, "X / 3  =  12
116 FOR N= 1 TO 1000:NEXT
118 PRINT@512, "TO SOLVE THE FIRST OR SECOND EQUATION, WE CAN ADD
TO OR SUBTRACT FROM BOTH SIDES OF THE EQUATION, THE SAME NUMBER.
120 FOR N = 1 TO 1000: NEXT
122 PRINT@704, "TO SOLVE THE THIRD OR THE FOURTH EQUATION, WE CAN
MULTIPLY OR   DIVIDE BOTH SIDES OF THE EQUATIONS WITH THE SAME NUM
BER.
124 GOSUB 6000
126 CLS
128 PRINT@386, "DON'T WORRY, "A$", IT IS EASIER THAN YOU THINK !!!
!"
130 GOSUB 6000:CLS
132 PRINT@64, "SOLVE FOR X VALUE IN EACH
134 PRINT@212, "X  +  9  =  16
136 PRINT@256, "SUBTRACT 9              -9     -9           FROM
 BOTH SIDES
138 FOR N = 1 TO 1000
140 PRINT@339, " X        =   7
142 PRINT@532, "X  -  11  =  30
144 PRINT@576, "ADD 11                 + 11     +11           TO
BOTH SIDES
146 PRINT@660, "X        =    41"
148 PRINT@768, "tHESE PROCEDURES UNDO THE OPERATIONS OF ADDITION A
ND SUBTRACTION"
```

```
150 GOSUB 6000:CLS
152 PRINT@92, "5X  =  45"
154 PRINT@128, "DIVIDE BOTH SIDES             /5  =  /5
   BY 5
156 FOR N= 1 TO50:PRINT@220,"                ":PRINT@220, " X  =  9":
NEXT
158 PRINT@412, "X / 3  =  12"
160 PRINT@448, "MULTIPLY BOTH SIDES         (3)          (3)
    BY 3"
162 FOR N = 1 TO 50:PRINT@540, "                        ":PRINT@540,"
X  =  36":NEXT
164 FOR N=1 TO 1000:NEXT
166 PRINT@640, "THESE PROCEDURES ARE USED TO UNDO MULTIPLICATION A
ND DIVISION."
168 PRINT@768, "WHEN SOLVING EQUATIONS, REMEMBER TO ADD OR SUBTRAC
T FIRST.
170 PRINT@832, "MULTIPLICATION OR DIVISION SHOULD BE DONE LAST.
172 GOSUB 6000
174 CLS
176 PRINT@330, "GET READY FOR THE TEST ON SOLVING EQUATIONS!!"
178 GOSUB 6000
180 CLS
440 DATA "X + 3 = 8",5,"A + 0.27 = 2.89",2.62
445 DATA "Y + 12 = 27",15,"T + .375 = 4.625",4.25
450 DATA "8.4 + A = 12.9",4.5,"X - 8 = 15",23
460 DATA "Z - 11 = 17",28,"Y - 2.18 = 1.78",3.96
470 DATA "Z - 3.5 = 7.9",11.4,"3X = 6",2
480 DATA "4Y = 3.6",.9,"12Y = 60",5
490 DATA "6X = 0.18",.03,"22W = 374",17
500 DATA "X / 5 = 6",30,"Y / 3 = 12",36
510 DATA "X / 4.3 = 0.75",3.225,"Y / 4 = 0.65",2.6
520 DATA "2X + 13 = 25",6,"5X - 32 = 53",17
750 FOR N = 1 TO 20
760   READ A$(N),B(N)
770 NEXT
780 FOR N = 1 TO 20
790   X = RND(20)
800   IF A$(X) = "0" GOTO 790
810   C$(N) = A$(X): D(N) = B(X)
820   A$(X) = "0"
830 NEXT
840 CLS
850 FOR N = 1 TO 20
860   PRINT@ 180, "PROB. #" N
870   PRINT@ 260,"SOLVE FOR THE VARIABLE IN   " C$(N)
880  PRINT@388," ";:INPUT "YOUR VALUE, PLEASE ";V
890    IF V=D(N) GOSUB 5000:C=C+1:ELSE GOSUB 5500
910 GOSUB 6000
920 CLS
930 NEXT
931 N=N-1
940 CLS
```

```
950 PRINT@384,A$", YOU HAVE "C" OUT OF "N" CORRECT, FOR A SCORE OF
 "(C/N)*100"%":IF N>=20 GOTO 960
951 PRINT@512,"ENTER R TO RETURN":PRINT"ENTER C TO CONTINUE"
952 INPUT B$
953 IF B$="R" RETURN
955 PRINT@576,"                                ":PRINT"
                     ":PRINT"
   "
960 PRINT@512, "BE SURE TO GET THIS GRADE RECORDED BEFORE GOING ON
 !"
970 GOSUB 6000
980 CLS
990 PRINT@389, "THE NEXT PART WILL DEAL WITH YOUR SPECIAL VOCATION
AL AREA."
1000 PRINT@517, "LOOK AT THE MENU THAT WILL APPEAR AND MAKE YOUR S
ELECTION."
1010 GOSUB6000
1020 GOTO 4000
4000 CLS
4010 PRINT@30, "MENU"
4020 PRINT@275, "1";TAB(25); "AUTOMOTIVE"
4030 PRINT@339, "2";TAB(25); "BEAUTY CULTURE"
4040 PRINT@403, "3";TAB(25); "CLIMATE CONTROL"
4050 PRINT@467, "4";TAB(25); "ELECTRICAL"
4060 PRINT@531, "5";TAB(25); "MED. DENT.TECH."
4070 PRINT@595, "6";TAB(25); "REC. VECHICLES"
4080 PRINT@659, "7";TAB(25); "BUILDING TRADES"
4090 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
4100 ON Q GOTO 6020, 6100, 6200, 6300, 6400, 6500, 6600
5000  Y = RND(5)
5010 ON Y GOTO 5020,5030,5040,5050,5060
5020 A1$ = "tHAT'S INCREDIBLE":GOTO 5070
5030 A1$ = "RIGHT ON !!":GOTO 5070
5040 A1$ = "THAT'S BOSS !!!":GOTO 5070
5050 A1$ = "YOU'RE PRETTY GOOD !!!":GOTO 5070
5060 A1$ = "ALL - RIGHTTTTTTTT !":GOTO5070
5070 FOR H = 1 TO 100: PRINT@536,A1$:PRINT@536,"
     ";:NEXT:RETURN
5500 PRINT@453,"SORRY, "A$ ", THE CORRECT ANSWER IS "D(N):RETURN
6000 PRINT @960,"PRESS C TO CONTINUE"
6001 I$=INKEY$:IFI$="C" THEN RETURN
6002 IF I$="S" GOTO 940
6003 GOTO 6001
6017 '****************************************************
6018 '*************  AUTOMOTIVE PROBLEMS        ***************
6019 '****************************************************
6020 CLS
6030 PRINT@448,"PROB. #1  A CAR HAS HAD 8 OIL CHANGES.IF THE CAR H
AS BEEN DRIVEN 50,000 MILES AND THE OIL HAS BEEN CHANGED AT REGULA
R INTERVALS HOW OFTEN DO THE OIL CHANGES OCCUR. (50,000=8X, SOLVE
FOR X)";:X=6250:INPUT C
6031 IF C=6250 PRINT"THAT IS CORRECT":K=K+1:ELSE PRINT"SORRY! THE
CORRECT ANSWER IS 6250"
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6040 GOSUB 6000:CLS:PRINT@448,"PROB.#2 IF 5 CANS OF OIL COST $8.00
 HOW MUCH DOES ONE CAN COST. (5X=8.00 SOLVE FOR X)":X=1.60:INPUT C
:IF C=X THEN PRINT"THAT IS CORRECT":K=K+1:ELSE PRINT"SORRY! THE CO
RRECT ANSWER IS $1.60"
6050 GOSUB 6000:CLS:PRINT@448,"     A CUSTOMER NEEDS A NEW TRANSMI
SSION.IT WILL COST $843. THE TOTAL COST IS BROKEN DOWN IN TO PARTS
 AND LABOR.IF THE MECHANIC CHARGES $20.00 AN HOUR AND THE PARTS CO
ST $423.  HOW MANY HOURS DOES THE MECHANIC WORK";
6051 PRINT"(423+20X=843 SOLVE FOR X)":X=21:INPUT C:IF C=X PRINT"TH
AT IS CORRECT":K=K+1:ELSE PRINT"SORRY! THE CORRECT ANSWER IS 21"
6058 PRINT@832,"YOUR SCORE FOR THIS SPECIAL SECTION IS"(K/3)*100"%
"
6059 GOSUB 6000
6060 GOTO 7000
6098 '*******    BEAUTY CULTURE PROBLEMS  **********************
6099 '*********************************************************
6100 CLS
6120 PRINT@448,"THREE SWITCH'S COMBINED LENGTH IS 72'' WHAT IS THE
 AVERAGE      LENGTH OF EACH (3X=72 SOLVE FOR X)":X=24:INPUT C:IF
C=X PRINT"THAT IS CORRECT":K=K+1:ELSE PRINT"SORRY! THE CORRECT ANS
WER IS 24"
6124 GOSUB 6000:CLS:PRINT@448,"18 OF YOUR CLIENTS SPEND A TOTAL OF
 $396. WHAT IS THE AVERAGE   EACH CLIENT SPENDS
   (18X=396 SOLVE FOR X)":X=22:INPUT C:IF C=X PRINT"THAT IS CORREC
T":K=K+1:ELSE PRINT"SORRY! THE CORRECT ANSWER IS 22"
6128 GOSUB 6000:CLS:PRINT@448,"A CLIENT SPENT A TOTAL OF $128 FOR
A MANICURE AND 2 COLD WAVES. IF THE MANICURE COST $8, HOW MUCH WAS
 EACH COLD WAVE. (128=2X+8 SOLVE FOR X)":X=60:INPUT C:IF C=X PRINT
"THAT IS CORRECT":K=K+1:ELSE PRINT"SORRY";
6130 GOSUB 6000
6132 CLS
6134 PRINT@384, "YOUR SCORE IN THIS AREA OF YOUR SPECIALTY IS "(K/
3)*100 " %."
6136 GOSUB 6000:GOSUB 7000
6197 '****************************************************
6198 '************** CLIMATE CONTROL PROBLEMS *****************
6199 '****************************************************
6200 CLS
6215 PRINT@448,"  SPECIFIC ENTHALPY IS ENTHALPY PER UNIT MASS. IT
IS MEASURED IN JOULES PER KILOGRAM.IF 100 KILOGRAMS OF A SUBSTANCE
 HAS A SPECI-FIC ENTHALPY ";
6220 PRINT"OF 20KJ/KG, WHAT IS THE TOTAL ENTHALPY. (20=X/100 SOLVE
 FOR X)";:X=2000:INPUT C:IF C=X PRINT"THAT IS CORRECT":K=K+1:ELSE
PRINT"SORRY! THE CORRECT ANSWER IS 2000"
6225 GOSUB 6000:CLS:PRINT@448,"     A FOOD FREEZER IS DESIGNED TO
 OPERATE AT A TEMPATURE OF 5 DEGREES.IF IT IS RUNNING 18 DEGREES A
BOVE ITS NORMAL TEMP., WHAT IS ITS TEMPATURE (X=5+18 SOLVE FOR X)"
;
6227 X=23:INPUT C:IF C=X PRINT"THAT IS CORRECT":K=K+1:ELSE PRINT"S
ORRY! THE CORRECT ANSWER IS 23"
6230 GOSUB6000:CLS:PRINT"AN AUTOMATIC DEFROST CYCLE IS ACTIVATED E
VERY 12 HOURS. HOW MANYTIMES HAS IT BEEN ACTIVATED IN A PERIOD OF
72 HOURS(12X=72 SOLVE FOR X)";:X=6:INPUT C:GOSUB6432
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6246 GOSUB 6000
6248 CLS
6250 PRINT@384, "YOUR SCORE FOR THIS SECTION IS "(K/3)*100 " %."
6252 GOSUB 6000
6254 GOSUB 7000
6297 '**********************************************************
6298 '******     ELECTRICAL PROBLEMS          *****************
6299 '**********************************************************
6300 CLS
6305 PRINT@448," A BILL FOR ELECTRICITY IS 98$ FOR 1000 KILOWATT H
OURS. WHAT IS THE COST PER HOUR. (98=1000X SOLVE FOR X)":X=98/1000
:INPUTC:GOSUB6432
6310 GOSUB 6000:CLS:PRINT@448," IF THE PEAK VALUE OF A SINE WAVE I
S 60 VOLTS, WHAT IS THE PEAK TO PEAK VOLTAGE. (X/2=60 SOLVE FOR X)
":X=120:INPUT C:IF C=X PRINT"THAT IS CORRECT":K=K+1:ELSE PRINT"SOR
RY! THE CORRECT ANSWER IS 120"
6320 GOSUB6000:CLS:PRINT@448,"        UNINSULATED HOT WATER TANKS
USE 500 KWH PER MONTH. IF BY INSULATING YOU SAVE $35.00, WHAT IS T
HE SAVINGS PER KILOWATT. (500X=35.00 SOLVE FOR X)":X=35/500:INPUT
C
6322 IFC=X PRINT"THAT IS CORRECT":K=K+1:ELSE PRINT"SORRY! THE CORR
ECT ANSWER IS ";X
6366 GOSUB 6000
6368 CLS
6370 PRINT@384, "WELL, "A$", YOUR SCORE FOR THIS SECTION IS "(K/3)
*100 " %"
6372 GOSUB 6000
6374 GOSUB 7000
6398 '******************************************************
6399 REM *******    MED. DENT. TECHNICIAN PROBLEMS    *********
6400 CLS
6410 CLS:PRINT@448,"   AT BIRTH THERE ARE APPROXIMATELY 44 TEETH.
SOME ARE PERMANENT AND SOME ARE DECIDUOUS.  IF THERE ARE 20 DECIDU
OS, HOW MANY ARE PERMANENT. (X+20=44    SOLVE FOR X)";:X=24:INPUTC
:GOSUB6432
6420 GOSUB 6000:CLS:PRINT@448,"     IF AN ADULT HAS ALL 32 TEETH P
RESENT AND THERE ARE 4 EQUAL QUADRANTS IN A MOUTH, HOW MANY ARE IN
 EACH QUADRANT.(32=4X SOLVE FOR X)";:X=8:INPUT C:GOSUB 6432
6430 GOSUB 6000:CLS:PRINT@448,"A PATIENTS TOTAL BILL IS $46. IF $3
0 WAS THE SHARGE FOR X-RAYS, HOW MUCH WAS CHARGED FOR CLEANING THE
 TEETH. (46=30+X SOLVE FOR X)";:X=16:INPUT C:GOSUB 6432
6431 GOTO 6450
6432 IF C=X PRINT"THAT IS CORRECT":K=K+1:ELSE PRINT"SORRY! THE COR
RECT ANSWER IS ";X
6433 RETURN
6450 GOSUB 6000
6452 CLS
6454 CLS:PRINT@384, "YOUR SCORE FOR THE SPECIAL PROBLEMS IS "(K/3)
*100 " % ."
6456 GOSUB 6000: GOSUB 7000
```

```
6497 '**********************************************************
6498 '******** REC VEHICLE PROBLEMS  ****************
6499 '****************************************************
6500 CLS
6510 PRINT@448,"A TWIN ENGINE PLANE HOLDS 80 GALLONS OF GASOLINE.
IF IT TOOK 47.5 GALLONS TO FILL UP, HOW MANY GALLONS WERE ALREADY
IN THE TANK. (80 = 47.5+X)";:X=32.5:INPUT C:GOSUB 6432
6520 GOSUB 6000:CLS:PRINT@448,"  A SMALL BOAT CAN CARRY 8 PASSENGE
RS. THE NEXT LARGER BOAT CAN HOLD MUCH MORE. IF BOTH BOATS CAN HOL
D 22 PEOPLE, HOW MANY DOES THE SECOND BOAT HOLD. (X+8=22 SOLVE FOR
 X)";:X=14:INPUT C:GOSUB6432
6530 GOSUB 6000:CLS:PRINT@448,"A CLEARANCE SALE ON MOTORCYCLES REA
DS; '2 FOR 22.50' ; HOW MUCH WOULD EACH TIRE COST. (2X=22.50 SOLVE
 FOR X)";:X=11.25:INPUT C:GOSUB 6432
6580 GOTO 6450
6597 '***************************************************
6598 '********* BUILDING TRADE PROBLEMS  ******************
6599 '***************************************************
6600 CLS
6610 PRINT@448,"B&G CONSTRUCTION CHARGES $42 PER SQUARE FOOT WHEN
THEY BUILD. IFTHE BUYER IS QUOTED A PRICE OF $147,000 , HOW MANY S
Q.FT. IS THE BUILDING. (147,000=42X)";:X=147000/42:INPUT C:GOSUB 6
432
6620 GOSUB6000:CLS:PRINT@448," IF 12 SQUARES OF SHINGLES ARE NEEDE
D TO SHINGLE A ROOF AND THE TOTAL COST WAS $2160, HOW MUCH IS EACH
 SHINGLE. (12X=2160 SOLVE FOR X)";:X=2160/12:INPUT C:GOSUB6432
6630 GOSUB6000:CLS:PRINT@448,"  AFTER A 47 CENT INCREASE, CROWN MO
LDING COSTS $4.38 PER BOARD FOOT. WHAT WAS THE OLD PRICE. (47+X=4.
38 SOLVE FOR X)";:X=3.91:INPUTC:GOSUB6432
6640 GOTO 6450
7000 CLS
7001 PRINT@455, "GOOD BYE, "A$ ". IT HAS BEEN A PLEASURE !!"
```

SOLVING EQUATIONS

Peer Tutor Reference Guide

Sample #1

$$x + 5 = 11$$

find x

By subtracting 5 from BOTH sides of the equation, we can isolate x. Remember equations are = (equal) and to keep them in balance, whatever is done to one side of the equation, must be done to the other.

$$\begin{array}{cccccc} x & + & 5 & = & 11 \\ & - & 5 & & -5 \\ x & & & = & 6 \end{array}$$

Check your answer by replacing x with 6: $6 + 5 = 11$

SOLVING EQUATIONS

Peer Tutoring Reference Guide

Sample #2

$$m - 12 = 28$$

find m

By adding 12 to BOTH sides of the equation (equal sign) we will find m alone.

$$\begin{array}{rrrcr} m & - & 12 & = & 28 \\ & + & 12 & & +12 \\ m & & & = & 40 \end{array}$$

Check your answer by replacing m with 40: $40 - 12 = 28$

SOLVING EQUATIONS

Peer Tutoring Reference Guide

Sample #3

$$7r = 42$$

find r

When we see 7r, this actually means 7 times r. In order to find 1r, we must divide BOTH sides of the equation by 7. Since any number over itself equals 1:

$$\frac{7r}{7} = \frac{42}{7}$$

$$r = 6$$

Check your answer by replacing r with 6: $7 \times 6 = 42$

SOLVING EQUATIONS

Peer Tutoring Reference Guide

Sample #4

$$\frac{P}{4} = 9$$

By multiplying BOTH sides of the equation by 4, we will find 1P. If we understand that $\frac{P}{4}$ is the same as $\frac{1}{4}P$, then we can see that the same rule applies for multiplication.

$$\frac{P}{4} = \frac{1}{4} P$$

$$\frac{\frac{1}{4}P}{\frac{1}{4}} = \frac{9}{\frac{1}{4}}$$

Any number divided by itself equals 1.

$$1P = 9 \div \tfrac{1}{4}$$

$$1P = \frac{9}{1} \times \frac{4}{1}$$

$$P = 36$$

Check: $\frac{36}{4} = 9$

SOLVING EQUATIONS

Peer Tutoring Reference Guide

Sample #5

$$3x + 2 = 17$$

find x

When solving multi-step problems, we must add or subtract first, then multiply or divide.

STEP I

$$\begin{array}{rcrcr} 3x & + & 2 & = & 17 \\ & - & 2 & - & 2 \\ 3x & & & = & 15 \end{array}$$

STEP II

$$\frac{3x}{3} = \frac{15}{3}$$

$$x = 5$$

Check: $(3 \times 5) + 2 = 17$

$15 + 2 = 17$

SOLVING EQUATIONS

Worksheet

1. $a + 7 = 12$

   find a _______

2. $2b = 1.8$

   find b _______

3. $x + 2.4 = 7$

   find x _______

4. $f - 2 = 10$

   find f ______

5. $x - 5 = 1.1$

   find x _______

6. $2c = 1.6$

   find c _______

7. $.7r = 2.1$

   find r _______

8. $c + .9 = 2.3$

   find c _______

9. $\frac{x}{5} = 16$

   find x _______

10. $r + .6 = 2.9$

    find r _______

11. $t + 1.3 = 7.2$

    find t _______

12. $2x + 3 = 12$

    find x _______

13. $\frac{x}{4} = 14$

    find x _______

14. $\frac{1}{4}r = 6$

    find r _______

15. $q - 1.5 = 7.9$

    find q _______

16. $z - 4.2 = 10$

    find z _______

17. $.4t = 19$

    find t _______

18. $5x + .4 = 2.9$

    find x _______

19. $\frac{p}{9} = 7.2$

    find p _______

20. $\frac{y}{4} = 9.6$

    find y _______

SOLVING EQUATIONS

This worksheet will enable you to see some practical vocational applications using simple equations. Not all of these problems relate to your particular area of vocational education. They will, however, give you a taste of the other vocational areas and how solving equations can be used.

1. If 4 tires cost $248, what is the cost per tire?

$$4x = \$248$$

2. Over a six-month period, a client spends a total of $78 for one cold wave and 2 wash and sets. If the cold was $42, how much was each wash and set?

$$3x + 42 = 78$$

3. A food freezer is designed to operate at 5^{0}F. If it is running 12^{0} colder than desired, what temperature is it running at?

$$18 - 12 = x$$

4. Uninsulated hot water tanks can use 400 kwh per month. If a family can save $25 a month by insulating, what is the rate?

$$400x = \$25$$

5. If a child has all 20 deciduous teeth present and there are four equal quadrants, how many teeth are in each quadrant?

$$20 = 4x$$

6. There is a clearance sale on radial tires. The ad reads "4 for $212." How much will one cost?

$$4x = \$212$$

7. After receiving an $18.00 increase, Morgan Doors currently sell for $112. What was the price before the increase?

$$\$112 = x + \$18$$

SOLVING EQUATIONS

Application Problem Worksheet, Continued

8. Ollie is sawing pieces of wood from a 90" plank. He wants one piece to be 15" long. The remainder of the plank is to be cut into 4 equal pieces. How long will each piece be?

$$4x + 15 = 90$$

9. Adam wants to make \$300 this week from a tile job. He is paid \$12.00 per hour. How many hours must Adam work?

$$\$300 = 12 \times \text{hours}$$

10. Sal bought a CB radio for his van. If he paid with a \$100 bill and received \$42 change, how much did the CB cost?

$$\$42 + x = \$100$$

I. PROGRAM TITLE - "Solving Equations With Formulas"

II. PROGRAM DESCRIPTION
  A. Students will view brief tutorial section.
  B. Students will solve equations using multi-stepped process.
  C. Students will use various mathematical rules to solve application problems.
  D. General Section uses data lines.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
  A. Peer Tutoring Reference Guide
  B. Worksheet
  C. Application Word Problems
  D. Additional Sources
    1. Algebra I Computer Tapes, Radio Shack (26-1702)
    2. Mervin L. Keedy et al., General Mathematics Menlo Park, California: Addison Wesley, 1980), Chapter 15, pp. 442-443.
    3. Merwin J. Lyung et al., Career Mathematics (Boston: Houghton Mifflin, 1974), Chapter 5, pp. 162-163.

V. SKILLS NEEDED
Addition, subtraction, multiplication and division of whole numbers and decimals.

```
4 ' **************   FORMULAS &    ****************************
5 ' **************      EQUATIONS          *******************
6 '  **************     WRITTEN  BY         *******************
7 '******* J. DALY, M.MCALISTER, M.MCNEARNEY  ****************
9 '  **************   1/81    FOR           *******************
10 ' **************  COMPUTER ASSISTED      *******************
11 ' **************     VOC MATH            *******************
12 ' **********************************************************
13 DIM A$(20),B(20),C$(20),D(20)
14 CLS
20 PRINT@384, " ";:INPUT "PLEASE TYPE IN YOUR NAME ";A$
90 CLS
95 PRINT @400," ********   SOLVING EQUATIONS   ********"
97 GOSUB 6000
99 CLS
100 CLS:PRINT @64, "IN YOUR WORK YOU WILL NEED TO SOLVE EQUATIONS"
102 PRINT @128,"USE THE FOLLOWING RULES:"
103 PRINT@258,"WRITE THE EQUATION"
104 FOR N=1 TO 100:PRINT@258,"WRITE THE EQUATION":PRINT @258,"
                       ":NEXT
105 PRINT@258,"WRITE THE EQUATION"
106 FOR N=1 TO 100:PRINT @ 322,"                         ":PRINT @
322,"SUBSTITUTE THE KNOWN VALUES":NEXT
108 FOR N=1 TO 100:PRINT@386,"
  ":PRINT @386,"USE THE ADDITION AND SUBTRACTION RULES":NEXT
110 FOR N=1 TO 100:PRINT @ 450,"                               ":
PRINT @450,"USE THE MULTIPLICATION AND DIVISION RULES":NEXT
115 FOR N=1 TO 100:PRINT @514,"                                ":
PRINT @514,"SIMPLIFY THE ANSWER":NEXT
120 FOR N=1 TO 100:PRINT @642,"                            ":PRI
NT @642,"AND CHECK YOUR ANSWER"
200 GOSUB6000
440 DATA"2X + 13 = 35",11,"8X + 41 = 105",8,"5X - 32 = 53",17
445 DATA"3T + 7 = 25",6,"9Y + 8 = 17",1,"4P - 13 = 27",10
450 DATA"9a - 48 = 6",6,"X/2 + 1 = 9",16,"Y/3 + 5 = 29",72
460 DATA "8Y - 3 = 61",8,"A/5 - 3 = 2",25,"B/8 - 5 = 1",48
470 DATA ".3Y / 1.8 = 6.5",39,"1.2A + 4.3 = 115.7",92.83
480 DATA "1.4X + 3 =7",2.86,".5X - 4 = 1.3",10.6," X + 3.5 = 7.5",
4
490 DATA "Y - 1.34 = 6.65",7.99,"16X = 96",6
500 DATA "3X + 4X - 2X + 4 = 11",1.4
750 FOR N = 1 TO 20
760   READ A$(N),B(N)
770 NEXT
780 FOR N = 1 TO 20
790   X = RND(20)
800   IF A$(X) = "0" GOTO 790
810   C$(N) = A$(X): D(N) = B(X)
820   A$(X) = "0"
```

```
830 NEXT
840 CLS
850 FOR N = 1 TO 20
860   PRINT@ 180, "PROB. #" N
870   PRINT@ 260,"SOLVE FOR THE VARIABLE IN   " C$(N)
880  PRINT@388," ";:INPUT "YOUR VALUE, PLEASE ";V
890    IF V=D(N) GOSUB 5000:C=C+1:ELSE GOSUB 5500
910 GOSUB 6000
920 CLS
930 NEXT
940 CLS
950 PRINT@384, "YOUR SCORE FOR THIS QUIZ IS  " (C/20)*100 " %."
960 PRINT@512, "BE SURE TO GET THIS GRADE RECORDED BEFORE GOING ON
 !"
970 GOSUB 6000
980 CLS
982 GOTO1019
990 CLS:PRINT@389, "THE NEXT PART WILL DEAL WITH YOUR SPECIAL VOCA
TIONAL AREA."
1000 PRINT@517, "LOOK AT THE MENU THAT WILL APPEAR AND MAKE YOUR S
ELECTION."
1010 GOSUB6000
1019 CLS:IF L2 = 2 THEN GOTO4000
1020 PRINT @64,"EVERY FIELD OF INDUSTRY USES FORMULAS IN ITS DAILY
 OPERATION."
1022 PRINT @128,"YOU SHOULD BEGIN NOW TO DEVELOP SKILL IN SOLVING
PROBLEMS WITH  FORMULAS."
1024 PRINT @320, "EXAMPLE    THE NUMBER OF STANDARD BRICKS NEEDED
TO BUILD A WALL IS ABOUT 21 TIMES THE VOLUME OF THE WALL.  HOW MAN
Y BRICKS WILL IT TAKE TO BUILD A WALL 6 IN WIDE , 8 FT HIGH, 14 FT
 LONG?
1025 PRINT @576,"SOLUTION    WE CAN WRITE THE FORMULA FOR BUILDING
 THE WALL AS                FOLLOWS:"
1026 PRINT @716, "N = 21V"
1027 PRINT @768," WHERE      N = THE NUMBER OF BRICKS, AND V = THE
 VOLUME"
1029 PRINT @844,"BY SUBSTITUTING THE KNOWN VALUES IN THE FORMULA
               N = 21 X 14 X 1/2 X 8       THUS N = 1176"
1030 GOSUB6000
1035 L2 = 2:GOTO 990
4000 CLS
4010 PRINT@30, "MENU"
4020 PRINT@275, "1";TAB(25); "AUTOMOTIVE"
4030 PRINT@339, "2";TAB(25); "BEAUTY CULTURE"
4040 PRINT@403, "3";TAB(25); "CLIMATE CONTROL"
4050 PRINT@467, "4";TAB(25); "ELECTRICAL"
4060 PRINT@531, "5";TAB(25); "MED. DENT.TECH."
4070 PRINT@595, "6";TAB(25); "REC. VECHICLES"
4080 PRINT@659, "7";TAB(25); "BUILDING TRADES"
4090 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
```

```
4100 ON Q GOTO 6020, 6100, 6200, 6300, 6400, 6500, 6600
5000  Y = RND(5)
5010 ON Y GOTO 5020,5030,5040,5050,5060
5020 A1$ = "tHAT'S INCREDIBLE":GOTO 5070
5030 A1$ = "RIGHT ON !!":GOTO 5070
5040 A1$ = "THAT'S BOSS !!!":GOTO 5070
5050 A1$ = "YOU'RE PRETTY GOOD !!!":GOTO 5070
5060 A1$ = "ALL - RIGHTTTTTTTT !":GOTO5070
5070 FOR H = 1 TO 100: PRINT@536,A1$:PRINT@536,"
      ";:NEXT:RETURN
5500 PRINT@453,"SORRY, "A$ ", THE CORRECT ANSWER IS "D(N):RETURN
6000 PRINT@ 960, "PRESS C TO CONTINUE."
6001 I$=INKEY$:IFI$="C" THEN RETURN ELSE 6001
6017 '*****************************************************
6018 '*************  AUTOMOTIVE PROBLEMS        ****************
6019 '*****************************************************
6020 CLS
6030 PRINT@64, "EACH PISTON IN AN ENGINE GOES UP AND DOWN INSIDE A
 CYLINDER."
6031 PRINT@128, "AS IT GOES UP, IT FORCES GAS AND AIR UP INTO THE
SPACE ABOVE THECYLINDER."
6032 PRINT@256,"THE GAS IS THEN IGNITED BY THE SPARK FROM THE SPAR
K PLUG."
6034 PRINT@384, "THE DISPLACEMENT OF A CYLINDER IS THE VOLUME OF G
AS FORCED UP"
6035 PRINT@448, "BY THE PISTON.  tHIS VOLUME CAN BE MEASURED USING
 THE DISTANCE "
6036 PRINT@512, "THE TOP OF THE PISTON TRAVELS."
6038 PRINT@640,"tHE FORMULA WE USE TO FIND DISPLACEMENT IS "
6040 PRINT@790, "D'= PI  X  C  X  C  X  H"
6042 GOSUB 6000
6044 CLS
6046 PRINT@86, "D = PI  X  C  X  C  X  H"
6048 PRINT@192, "PI = 3.14 ,  C = RADIUS OF THE CYLINDER , H = PIS
TON'S STROKE"
6050 PRINT@320,"SUBSTITUTE IN THE FORMULA ABOVE, TO FIND D (ROUND
OFF TO TENTHS)"
6052 PRINT@448, "PROB. # 1   IF C  =  2  AND  H  =  4";:INPUT"
  THEN      D = ";A:IF A = 50.2 THEN PRINT "CORRECT":K = K + 1:ELS
E PRINT "WRONG, tHE CORRECT ANSWER IS 50.2"
6054 PRINT@576, "PROB. # 2   IF C = 4.5 AND H = 7 ";:INPUT "    TH
EN     D = ";B:IF B = 445.1 THEN PRINT "CORRECT":K = K+1:ELSE PRIN
T "WRONG, tHE CORRECT ANSWER IS 445.1 "
6056 PRINT@704, "PROB. # 3   IF C = 3.5 AND H = 4.4    ";:INPUT "
   THEN    D = ";C:IF C = 169.2 THEN PRINT "CORRECT! ":K = K+1:ELS
E PRINT "WRONG, THE CORRECT ANSWER IS 169.2 "
6058 PRINT@832, "YOUR SCORE FOR THIS SPECIAL SECTION IS "(K/3)*100
 " %."
6059 GOSUB 6000
6060 GOTO7000
```

```
6097 '***********************************************************
6098 '*******    BEAUTY CULTURE PROBLEMS  **********************
6099 '***********************************************************
6100 CLS
6102 PRINT@69,"TO MIX A CERTAIN HAIR DYE, AN OPERATOR MUST USE 3 P
ARTS          OF SOLUTION 'A' FOR EVERY 4 PARTS OF SOLUTION 'B'.
6103 FOR N=1 TO 1600:NEXT
6104 PRINT @273,"USE THE FOLLOWING FORMULA"
6105 FOR N=1 TO 100:PRINT @408,"                         ":PRINT @40
8,"A/B = 3/4":NEXT
6106 PRINT @530,"TO SOLVE THESE PROBLEMS"
6107 FOR N= 1 TO 500:NEXT
6108 PRINT@644, "REMEMBER THAT THE 2 FRACTIONS MUST BE MADE EQUAL
TO SOLVE."
6109 FOR N= 1 TO 500:NEXT
6110 PRINT@778, "WE CAN DO THIS BY CROSS MULTIPLICATION. "
6111 GOSUB 6000: CLS
6112 PRINT@90, "A / B  =  3 / 4"
6114 PRINT@192, "PROB. # 1"
6116 PRINT@256, "HOW MANY OUNCES OF SOLUTION  'A'  SHOULD AN OPERA
TOR USE FOR "
6118 PRINT@320, "A MIXTURE IF 12 OUNCES OF SOLUTION 'B' ARE USED";
:INPUT A:IF A = 9 THEN PRINT "CORRECT":K4=K4+1:ELSE PRINT "WRONG,
THE CORRECT ANSWER IS 9."
6119 PRINT@448, "PROB. # 2"
6120 PRINT@512, "HOW MANY OUNCES OF SOLUTION  'B'  SHOULD AN OPERA
TOR USE FOR "
6122 PRINT@576, "A MIXTURE IF 15 OUNCES OF SOLUTION  'A' ARE USED"
;:INPUT B:IF B = 20 THEN PRINT "CORRECT":K4 = K4 + 1:ELSE PRINT "W
RONG, THE CORRECT ANSWER IS 20. "
6124 PRINT@704, "PROB. # 3"
6126 PRINT@768, "HOW MANY OUNCES OF SOLUTION  'A' SHOULD AN OPERAT
OR USE FOR "
6128 PRINT@832, "A MIXTURE IF 5 OUNCES OF SOLUTION  'B'  IS USED (
USE DECIMAL IN ANS.)";:INPUT C :IF C =3.75 THEN PRINT "CORRECT, "A
$:K4 = K4 + 1:ELSE PRINT "WRONG, THE CORRECT ANSWER IS 3.75 "
6130 GOSUB 6000
6132 CLS
6134 PRINT@384, "YOUR SCORE IN THIS AREA OF YOUR SPECIALTY IS "(K4
/3)*100 " %."
6136 GOSUB 6000:GOSUB 7000
6175 GOSUB 6000
6197 '****************************************************
6198 '************* CLIMATE CONTROL PROBLEMS ****************
6199 '****************************************************
6200 CLS
6205 PRINT@64, "A REFRIGERATING OR AIR CONDITIONING MECHANISM CAPA
BLE OF ABSORB-"
6210 PRINT@128, "ING HEAT IS USUALLY RATED IN TONS PER 24 HOURS BY
 ITS HEAT AB-"
6215 PRINT@192, "SORBING ABILITY ( HA ) IN  BTU DIVIDED BY 288000.
"
6220 PRINT@330, " T   =   TONS OF REFRIGERATION EFFECT"
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6222 PRINT@394, " HA   =   HEAT ABSORBING ABILITY "
6224 PRINT@522, " T  =   HA / 288000  = TONS OF REFRIGERATION EFFE
CT"
6226 PRINT@704, "USE THIS FORMULA ABOVE TO DO THE NEXT THREE PROBL
EMS."
6228 GOSUB 6000
6230 CLS
6232 PRINT@90, "T  =  HA / 288000"
6234 PRINT@192, "USE THE FORMULA ABOVE TO SOLVE THE FOLLOWING."
6235 PRINT@256, "PROB.# 1"
6236 PRINT@320, "THE HEAT ABSORBING ABILITY OF A REFRIGERATOR UNIT
 IS RATED AT   2,016,000 BTU's PER 24 HRS.  WHAT IS THE TON RATING
";:INPUT A: IF A = 7 THEN PRINT "CORRECT":K1 = K1+1:ELSE PRINT"WRO
NG, THE CORRECT ANSWER IS 7. "
6238 PRINT@512, "PROB.# 2"
6240 PRINT@576,"wHAT WILL BE THE TON RATING OF A REFRIGERATING MEC
HANISM CAPABLEOF ABSORBING 3,168,000 BTU'S IN 24 HOURS.";:INPUT B:
IF B = 11 THEN PRINT "CORRECT":K1=K1+1:ELSE PRINT"WRONG, THE CORRE
CT ANSWER IS 11."
6242 PRINT@768, "PROB. # 3"
6244 PRINT@832, "WHAT IS THE  HA  OF A  3 TON REFRIGERATING SYSTEM
 ";:INPUT C:IF C =864,000 THEN PRINT "CORRECT":K1=K1+1:ELSEPRINT "
WRONG, THE CORRECT ANSWER IS 864,000."
6246 GOSUB 6000
6248 CLS
6250 PRINT@384, "YOUR SCORE FOR THIS SECTION IS "(K1/3)*100 " %."
6252 GOSUB 6000
6254 GOSUB 7000
6297 '*********************************************************
6298 '*******    ELECTRICAL PROBLEMS           *****************
6299 '**********************************************************
6300 CLS
6302 PRINT@384, "WE USE ELECTRICITY EVERY DAY FOR LIGHT,HEAT,APPLI
ANCES, AS WELL AS FOR RADIO, TELEVISION, AND OTHER COMMUNICATION.
 INDUSTRIES  DEPEND ON ELECTRICITY TO RUN TOOLS AND MACHINES, PROV
IDE HEAT
6305 PRINT@576,"FOR PROCESSES SUCH AS STEELMAKING, AND MANY OTHER
PURPOSES."
6306 FOR N= 1 TO 2000:NEXT:CLS
6310 PRINT@64,"THE ENERGY OF ELECTRICITY IS CONTROLLED AND TRANSMI
TTED BY CON- DUCTORS, USUALLY METAL WIRES. THE FLOW OF ELECTRICITY
, OR ELEC- TRICAL CURRENT IS MEASURED IN THREE WAYS.
6313 FOR N=1 TO1000: NEXT
6315 PRINT@320,"1. THE RATE OF FLOW OF A CURRENT IS MEASURED IN AM
PERES. tHIS       CAN BE COMPARED TO THE RATE OF WATER FLOWING THRO
UGH A PIPE.
6318 FOR N= 1 TO 1000:NEXT
6320 PRINT@512, "2. THE PRESSURE UNDER WHICH THE CURRENT FLOWS IS
THE MEASURE       OF ITS VOLTAGE.
6324 FOR N= 1 TO1000:NEXT
6325 PRINT@704,"3. THE RESISTANCE THAT THE WIRE OFFERS TO THE CURR
ENT'S FLOW       IS MEASURED IN OHMS.  THE RESISTANCE OF THE WIRE
DEPENDS ON      THE TYPE OF METAL USED AND THE LENGTH AND DIAMETER
OF THE       WIRE.
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6326 GOSUB 6000
6327 CLS
6328 CLS
6330 PRINT@64, "VOLT'S, AMPERES, AND OHMS ARE RELATED.  IT TAKES O
NE VOLT TO FORCE ONE AMPERE OF CURRENT THROUGH A RESISTANCE OF ONE
 OHM."
6332 FOR N=1 TO 1000:NEXT
6334 PRINT@256, "THE FORMULA WE USE TO EXPRESS THIS IS "
6336 FOR N= 1TO1000:NEXT
6338 PRINT@405, "VOLTS  =  AMPS  X  OhMS"
6340 FOR N= 1TO 1000:NEXT
6342 PRINT@512, "EXAMPLE  -  HOW MANY VOLTS ARE NEEDED TO SEND A C
URRENT OF 2 AM-PERES THROUGH A RESISTANCE OF 60 OHMS?"
6344 PRINT@704, "SOLUTION   -   VOLTS  =  2 AMPS  X  60 OHMS
6346 PRINT@857, "   =  120 VOLTS
6348 GOSUB 6000:CLS
6350 PRINT@80, "VOLTS  =  AMPERES  X  OHMS
6352 PRINT@128, "PROB. # 1
6354 PRINT@192, "HOW MANY VOLTS WILL IT TAKE TO SEND 6 AMPERES OF
CURRENT THROUGH A TOASTER WITH A RESISTANCE OF 24 OHMS";:INPUT A :
IF A = 144 THEN PRINT "CORRECT!!!":K2=K2+1:ELSE PRINT"WRONG, THE C
ORRECT ANSWER IS 144 VOLTS. "
6356 PRINT@384, "PROB. # 2
6358 PRINT@448, "HOW MANY AMPERES WILL 110 VOLTS SEND THROUGH A RE
SISTANCE OF 5  OHMS";:INPUT B:IF B = 22 THEN PRINT "SUPER, "A$:K2=
K2+1:ELSE PRINT "WRONG, tHE CORRECT ANSWER IS 22."
6360 PRINT@640, "PROB. # 3
6362 PRINT@704, "USING THE FORMULA, WATTS  =  VOLTS  X  AMPERES, H
OW MANY WATTS ARE USED BY AN MICROWAVE THAT DRAWS 8 AMPERES OF CUR
RENT ON A 240VOLT LINE";
6364 INPUT C: IF C = 1920 THEN PRINT "RIGHT ON!!!":K2=K2+1:ELSE PR
INT "WRONG, THE CORRECT ANSWER IS 1920."
6366 GOSUB 6000
6368 CLS
6370 PRINT@384, "WELL, "A$", YOUR SCORE FOR THIS SECTION IS "(K2/3
)*100 " %"
6372 GOSUB 6000
6374 GOSUB 7000
6398 '*****************************************************
6399 REM *******    MED. DENT. TECHNICIAN PROBLEMS    *********
6400 CLS
6405 PRINT@64, "CALCULATIONS FOR CHILDREN'S DOSAGES OF MEDICINE AR
E BASED ON AGEAND WEIGHT.  THESE DOSAGES ARE A PORTION OF AN ADULT
'S DOSAGE."
6410 PRINT@256, "TO FIND THE DOSAGE, USING AGE, USE yOUNG'S rULE."
6412 PRINT@395, " ( AC / AC+12 ) X  AD  =  CD "
6414 PRINT@448,  "WHERE"
6416 PRINT@525, "AC = AGE OF CHILD"
6418 PRINT@653, "AD = ADULT'S DOSAGE"
6420 PRINT@512, "IN THE FORMULAS, WE WILL USE THESE VARIABLES."
6422 PRINT@832, "THIS FORMULA WILL BE USED IN THE NEXT THREE SPECI
AL PROBLEMS."
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6424 GOSUB 6000
6426 CLS
6428 PRINT@64, "USE THIS FORMULA TO SOLVE THE FOLLOWING."
6430 PRINT@200, "CHILD'S DOSAGE  =  ( AC / AC + 12 )  X  AD"
6432 PRINT@256, "PROB. # 1"
6434 PRINT@320, "WHAT IS THE DOSAGE OF A THYROID PREPARATION FOR A
N EIGHT YEAR "
6436 PRINT@384, "OLD IF THE ADULT DOSAGE IS 100 MG ";:INPUT A :IF
A = 40 THEN PRINT "CORRECT":K3 = K3+1:ELSE PRINT "THE CORRECT ANSW
ER IS 40 MG."
6438 PRINT@512, "PROB. # 2"
6440 PRINT@576, "THE ADULT DOSAGE OF AN ANTIHISTAMINE IS 75 MG. wH
AT DOSAGE "
6442 PRINT@640, "SHOULD BE GIVEN TO A THREE YEAR OLD CHILD ";:INPU
T B:IF B = 15 THEN PRINT "CORRECT ":K3 = K3 +1:ELSE PRINT  "WRONG,
 tHE CORRECT ANSWER IS 15 MG. "
6444 PRINT@768, "PROB. # 3"
6446 PRINT@832, "A 12 YEAR OLD MUST BE GIVEN MEDICATION FOR A HEAR
T DISORDER. "
6448 PRINT@896,"WHAT DOSAGE WOULD BE GIVEN IF THE ADULT'S IS 9 MG"
;:INPUT C:IF C = 4.5 THEN PRINT "CORRECT":K3 = K3+1:ELSE PRINT "WR
ONG, THE ANSWER IS 4.5 MG."
6450 GOSUB 6000
6452 CLS
6454 PRINT@384, "YOUR SCORE FOR THE SPECIAL PROBLEMS IS "(K3/3)*10
0 " % ."
6456 GOSUB 6000: GOSUB 7000
6496 GOSUB 6000
6497 '**********************************************************
6498 '********* REC VEHICLE PROBLEMS  ****************
6499 '****************************************************
6500 GOTO6020
6597 '***************************************************
6598 '********** BUILDING TRADE PROBLEMS  ****************
6599 '***************************************************
6600 CLS:Y=2
6602 FOR X= 60 TO 80: SET (X,Y): Y=Y+1: NEXT
6603 Y=2
6604 FOR X =60 TO 40 STEP -1: SET(X,Y): Y= Y+1:NEXT
6605 FOR X= 40 TO 80: SET (X,22):NEXT
6606 FOR Y = 22 TO 26: SET (40,Y):SET(80,Y):NEXT
6607 FOR Y=2 TO 22STEP 2: SET(60,Y):NEXT:IFZ2=2 GOTO 6620
6608 PRINT @657,"THIS IS A LAYOUT OF A ROOF":FOR N=1TO1000:NEXT:PR
INT @ 717, "THE RISE IS THE HEIGHT OF THE ROOF"
6610 FOR N=1 TO 20: FOR Y=3 TO 21 STEP2:SET (60,Y):NEXT Y:FOR Y=3
TO 21 STEP 2:RESET(60,Y):NEXT:NEXT
6612 PRINT @770,"THE SPAN IS THE TOTAL WIDTH OF THE BUILDING UNDER
 THE ROOF"
6613 FOR N=1TO10:FOR X=40 TO 80:RESET(X,22):NEXT:FOR X=40 TO 80:SE
T(X,22):NEXT:NEXT
6614 PRINT @851,"THESE ARE THE RAFTERS"
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6615 FOR N=1 TO 7:Y=2:FOR X=60 TO80:RESET(X,Y):Y=Y+1:NEXT:Y=2:FOR
X=60 TO 40 STEP -1:RESET(X,Y):Y=Y+1:NEXT
6616 Y=2:FOR X=60 TO 80:SET(X,Y):Y=Y+1:NEXT:Y=2:FOR X=60 TO 40 STE
P-1:SET(X,Y):Y=Y+1:NEXT:NEXT
6617 GOSUB6000:CLS
6618 Z2=2:GOTO6600
6620 GOTO 6622
6622 FOR N= 1 TO 1000:NEXT
6624 PRINT@655, "H  =  RISE OR HEIGHT OF THE ROOF"
6626 FOR N=1 TO1000:NEXT
6628 PRINT@783, "S  =  LENGTH OF THE ROOF'S SPAN"
6629 FOR N=1 TO 1000:NEXT
6630 PRINT@911, "R  =  LENGTH OF THE RAFTER'S"
6632 GOSUB 6000
6634 CLS
6636 PRINT@64,"PROB. # 1"
6638 PRINT@128, "IF P  =  2R + S , FIND THE LENGTH OF A RAFTER (R)
 IF P = 68 AND S = 20 ";:INPUT A :IF A = 24 THEN PRINT "CORRECT":K
7 = K7+1:ELSE PRINT "WRONG, THE ANSWER IS 24."
6640 PRINT@384,"PROB. # 2"
6642 PRINT@448, "IF P = 2R + S, FIND THE LENGTH OF A RAFTER (R) IF
 P = 110 AND    S = 48";:INPUT B:IF B = 31 THEN PRINT "CORRECT":K7
 = K7+1:ELSE PRINT "WRONG, THE CORRECT ANSWER IS 31."
6644 PRINT@704, "PROB. # 3"
6646 PRINT@768, "IF A = 1/2  X  S  X  H,  FIND S IF A = 750 AND
H = 30";:INPUT C:IF C = 50 THEN PRINT "CORRECT":K7=K7+1:ELSE PRINT
"WRONG, THE CORRECT ANSWER IS 50."
6648 GOSUB 6000
6650 CLS
6652 PRINT@384, "YOUR SCORE ON YOUR SPECIAL AREA PROBLEMS IS "(K7/
3)*100 " %"
6654 GOSUB 6000
6656 GOSUB 7000
6695 GOSUB 6000
7000 CLS
7001 PRINT@455, "GOOD BYE, "A$ ". IT HAS BEEN A PLEASURE !!"
7002 GOTO7002
```

SOLVING EQUATIONS WITH FORMULAS

Peer Tutoring Reference Guide

Solving equations is a breeze if you follow a few simple rules:

1. write the equation
2. then substitute in any known values
3. next combine like terms then complete any subtraction or addition necessary to isolate the variable
4. now divide or multiply
5. simplify if necessary
6. finally, check your answer

Now, let's look at a few problems and take it through the equation solving steps

SOLVING EQUATIONS WITH FORMULAS

Peer Tutoring Reference Guide

Sample #1

STEP I	write the equation	$2x + 3x + 10 = 25$
STEP II	there are no known values, so on to	
STEP III	combine like terms then subtract 10 from both sides of the equation	$2x + 3x = 5x$ $5x + 10 = 25$ $ - 10 \quad -10$ $5x \quad = 15$
STEP IV	if 5 times x is equal to 15, then by dividing both sides by 5, we can find 1x	$\frac{5x}{5} = \frac{15}{5}$ $x = 3$
STEP V	this problem is in its simplest form so on to	
STEP VI	Check: by plugging the value of x back into the original equation	$2x + 3x + 10 = 25$ $2(3) + 3(3) + 10 = 25$ $6 + 9 + 10 = 25$ $25 = 25$

SOLVING EQUATIONS WITH FORMULAS

Peer Tutoring Reference Guide

Sample #2

STEP I	write the equation	$1.5x - 6 = 9$
STEP II	there are no known values for x, so on to	
STEP III	there are no terms to combine; therefore, we can isolate x by adding 6 to both sides of the equation	$1.5x - 6 = 9$ $+6 \quad +6$ $1.5x = 15$
STEP IV	we know any number over (divided by) itself is 1 and so if we divide both sides of the equation by 1.5, we will find x	$\frac{1.5x}{1.5} = \frac{15}{1.5}$ $x = 10$
STEP V	this problem is in its simplest form, so on to	
STEP VI	Check: by plugging 10 back into the original equation	$1.5(10) - 6 = 9$ $15 - 6 = 9$ $9 = 9$

SOLVING EQUATIONS WITH FORMULAS

Worksheet

1. $4x + 7x + x = 12.12$

   $x =$ __________

2. $2.7x + x = 150$

   $x =$ __________

3. $4.8x + 5x = 190$

   $x =$ __________

4. $6t + 8 = 24$

   $t =$ __________

5. $y/4.2 = 7.88$

   $y =$ __________

6. $3x + 5x + 6x - 2x = 39$

   $x =$ __________

7. $y - 7.8 = 9.1$

   $y =$ __________

8. $5.2x + x = 31$

   $x =$ __________

9. $.5y/.9 = 7.2$

   $y =$ __________

10. $6x + 3x + x = 21$

    $x =$ __________

11. $5x - .4 = 26$

    $x =$ __________

12. $10x - .8 = 48$

    $x =$ __________

13. $10t + 15.9 = 15$

    $t =$ __________

14. $29x + 8x = 160$

    $x =$ __________

15. $y - 2.9 = 5.8$

    $y =$ __________

16. $3x + 5x + x = 27$

    $x =$ __________

17. $5t + 6 = 18$

    $t =$ __________

18. $y - .3 = 1.56$

    $y =$ __________

19. $x - .6 = 1.28$

    $x =$ __________

20. $3x - 2x + 3 = 19$

    $x =$ __________

SOLVING EQUATIONS WITH FORMULAS

This worksheet will enable you to see some practical vocational applications using formulas/equations. Not all of these problems relate to your particular area of vocational education. They will, however, aid in strengthening your ability to use equations.

1. The displacement of a cylinder is the volume of gas forced up by the piston. This volume can be measured using the distance that the top of the piston travels.

   The formula for displacement is:

   $$D = Pi \times C \times C \times H$$

   $Pi = 3.14$; C = radius of the cylinder; H = piston stroke

   Substitute in the formula above to find D (round off to the nearest tenth)

   $C = 1$
   $H = 3.1$
   $D = X$

2. To mix a certain hair dye, an operator must use 3 parts of solution 'A' for every 4 parts of solution 'B'.

   Use the following formula:

   $$\frac{A}{B} = \frac{3}{4}$$

   To solve this problem, remember that the two fractions must be made equal. We can do this by cross multiplication. How many ounces of solution 'A' should an operator use for a mixture if 21 ounces of solution 'B' are used?

3. A refrigerating or air conditioning mechanism, capable of absorbing heat, is usually rated in tons per 24 hours by its heat-absorbing ability (HA) in BTU, divided by 288,000.

   T = tons of refrigeration effect

   HA = heat absorbing ability

   $$T = \frac{HA}{288{,}000} = \text{tons of refrigeration effect}$$

   Use this formula for the following problem

   The heat absorbing ability of a refrigerator unit is rated at 1,440,000 BTU per 24 hours. What is the Ton rating?

Application Problem Worksheet, continued

4. Volts, amperes and ohms are related. It takes one volt to force through a resistance of one ohm. The formula we use to express this is

   Volts = amps x ohms

   How many volts will it take to send 5 amperes of current through a toaster with a resistance of 22 ohms?

5. Calculations for children's dosages of medicine are based on age and weight. These dosages are a portion of an adult's dosage.

   To find the dosage, using age, use Young's rule:

$$\frac{AC}{AC + 12} \times AD = CD$$

   AC = age of child
   AD = adult dosage

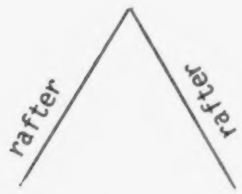
   What is the dosage of a thyroid preparation for a four-year old child if the adult dosage is 64 mg?

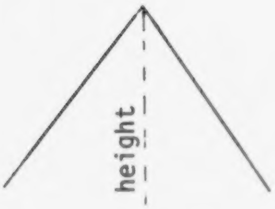
6. This is the layout of a roof. The rise is the height of the roof; the span is the total width of the building under the roof.

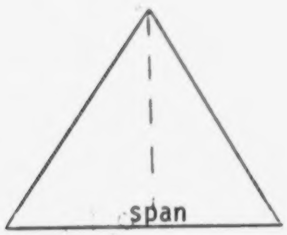
   P = perimeter
   R = length of the rafters
   H = rise of height of roof
   S = length of the roof's span

   If P = 2R + S, find the length of a rafter (R) if P = 60 and S = 20.

   R = _______







I. PROGRAM TITLE - "Shop Formulas"

II. PROGRAM DESCRIPTION
   A. Students will view a tutorial section that will show them how to solve formulas.
   B. Students will complete formula problems.
   C. Students will complete application problems as seen through a menu.
   D. Data lines are used throughout.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide
   B. Worksheet using various formulas
   C. Application Word Problems
   D. Additional Sources
      1. Merwin J. Lyng et al., Career Mathematics (Boston: Houghton Mifflin Co., 1977) pp. 158-166.
      2. Mervin L. Keedy et al., General Mathematics Menlo Park, California: Addison Wesley, 1980), pp. 312-348.

V. SKILLS NEEDED
   All operations using fractions, decimals and whole numbers.

```
3 '**********************************************************
4 '********************* USE OF SHOP FORMULAS ****************
5 '*********************   WRITTEN  BY         ****************
6 '*********************   m. MCNEARNEY        ****************
7 '*********************   M. MCALISTER        ****************
8 '*********************     2/81 FOR         ****************
9 '*********************  COMPUTER ASSISTED   ****************
10 '********************     VOC. MATH        ****************
11 '*********************************************************
12 DIM B$(10,9), A$(10,9)
13 CLEAR 200
16 FOR Q = 1 TO 10:FOR R = 1 TO 9:READ B$(Q,R):NEXT:NEXT
50 CLS
55 PRINT@384," ";: INPUT "PLEASE TYPE IN YOUR NAME";A$
57 GOSUB 6000
100 '************  TUTORIAL ON THE USE OF FORMULAS  **********
105 CLS
110 PRINT@ 389, "********  TECHNIQUES INVOLVED IN USING FORMULAS
********"
112 GOSUB 6000
115 CLS
120 PRINT@256, "MANY OF THE MORE COMMON RELATIONSHIPS OR PROCEDURE
S USED IN IN- DUSTRIES, SHOPS OR VOCATIONAL CLASSES CAN BE STATED
AS RULES OR FORMULAS."
125 PRINT@512, "THESE ARE VERY OFTEN CALLED 'SHOP' FORMULAS.  tHEY
 ARE DESIGNED TO FIND THE ANSWER TO THE WORKER'S PROBLEM AS EASILY
 AND AS     QUICKLY AS POSSIBLE.
127 GOSUB 6000
128 CLS
130 PRINT@ 64, "IN SOLVING A PROBLEM BY USING A FORMULA, THE FOLLO
WING STEPS ARENECESSARY"
135 GOSUB5000
140 PRINT@196, "1. THE DATA IN THE PROBLEM MUST BE LOOKED AT CAREF
ULLY SO          YOU CAN CHOOSE THE CORRECT FORMULA."
145 GOSUB 5000
150 PRINT@388,"2.  SUBSTITUTE THE DATA IN THE CHOSEN FORMULA."
155 GOSUB 5000
160 PRINT@516, "3.  PERFORM THE COMPUTATIONS INDICATED BY THE FORM
ULA."
163 GOSUB 5000
165 PRINT@644, "4. BE SURE TO GET THE ACCURACY REQUIRED BY THE PRO
BLEM."
170 GOSUB 5000
175 PRINT@768, "LET'S LOOK AT A TYPICAL PROBLEM WHERE A FORMULA IS
 USED DIRECTLY"
178 GOSUB 6000
179 CLS
180 PRINT@64, "A WORKMAN IS GOING TO MAKE AN ELLIPTICAL TANK WITH
A MAJOR AXIS OF 8 FEET AND A MINOR AXIS OF 6.25 FEET.  WHAT WILL T
HE AREA OF THE ELLIPSE BE?"
```

```
183 GOSUB 5000
185 PRINT@ 333, "IF A = THE MAJOR AXIS AND B = THE MINOR AXIS"
188 GOSUB 5000
190 PRINT@461, "USE THE FORMULA     AREA  =  .7854 AB"
195 GOSUB5000
200 PRINT@576, "NOW SUBSTITUTE THE VALUES YOU KNOW IN THIS FORMULA
 AND COMPUTE!!"
205 GOSUB 5000
210 PRINT@720, "AREA  =  .7854 x 8 X 6.25
220 GOSUB 5000
225 PRINT@845, "THE AREA WILL BE 39.27 SQUARE FEET."
230 GOSUB 6000
235 CLS
240 PRINT@384, "OKAY, "A$", GET YOUR PAPER AND PENCIL READY FOR TH
E TEST!"
242 PRINT@512, "ANY DECIMAL ANSWERS ARE TO ROUNDED OFF TO THE HUND
RETHS PLACE."
250 GOSUB 6000
251 CLS
255 FOR L = 1 TO 10
256 X = RND (10)
257 IF B$ (X,1)= "O" GOTO  256
258 FOR M = 1 TO 9
259 A$(L,M)=B$(X,M)
260 NEXT M
261 B$ (X,1) = "O"
262 NEXT L
279 FOR N=1 TO 10
280 PRINT@180, "PROB # "N
290 PRINT@270, "GIVEN THE FORMULA  " A$(N,1)
300 PRINT@384, "FIND "A$(N,2) " IF "A$(N,3)" AND "A$(N,4);
310 PRINT@419, "FIND "A$(N,5) " IF "A$(N,6)" AND "A$(N,7);
320 PRINT@520, " ";:INPUT A1$
330 IF VAL(A1$) = VAL(A$(N,8)) THEN PRINT@707, "CORRECT":C = C+1:E
LSE PRINT@707, "WRONG, ANSWER IS "A$(N,8)
340 PRINT@558, " ";:INPUT A2$
350 IF VAL(A2$) = VAL(A$(N,9)) THEN PRINT@745, "CORRECT":C = C+1:E
LSE PRINT@742, "WRONG, ANSWER IS "A$(N,9)
360 GOSUB 6000
370 CLS
380 NEXT N
390 CLS
400 PRINT @512,A$", YOUR SCORE IS, "(C/20)*100 " %.  PLEASE HAVE I
T RECORDED."
1000 DATA "A  =  1/2 BH",A,B=6,H=7,B,A=40,H=10,21,8
1010 DATA V=GT,V,G=8,T=4,T,G=4,V=16,32,4
1020 DATA W=D/E,W,D=16,E=2,D,E=4,W=10,8,40
1030 DATA D = O-2S,D,O=20.5,S=2.1,O,S=4.9,D=4.235,16.3,14.035
1040 DATA A=LW,A,L=2.3,W=8.23,W,L=1/3,A=8/3,18.929,8
1050 DATA P=2L+2W,P,L=5.8,W=6.23,W,L=8.29,P=27.384,24.06,5.402
1060 DATA T=(B-C)/2,T,B=10,C=2,B,C=4,T=8,4,20
```

```
1070 DATA V=3.14RRH,V,R=3,H=10,H,R=2,V=25.168,282.6,2
1080 DATA E=IR,E, I=2.3,R=5.28,R,E=16,I=2,12.144,8
1090 DATA R=E/I,R,E=4.2,I=.7,E,R=16,I=8,6,128
1100 DATA AUTOMOTIVE,"D = .7854 * B * B * S","FIND D IF B = 8 AND
S = 7","FIND D IF B = 4 AND S = 3","FIND S IF B = 3 AND D = 35.343
",351.859,37.6992,5
1110 DATA BEAUTY CULTURE,"PAY = RATE X TIME","FIND PAY IF r=$4.50
AND t=40","FIND RATE IF PAY = $210 AND T = 35","FIND TIME IF PAY =
 $83.75 AND R = $3.35",180,6,25
1120 DATA CLIMATE CONTROL,"   F = 9/5 X C +32","      FIND F IF C =
 15","      FIND C IF F = 77","      FIND F IF C = 35",59,25,95
1130 DATA ELECTRICAL, "  I = E / R","FIND i  IF e = 9 AND r = 12",
 " FIND  E  IF r = 10  AND I = .9","FIND E  IF I  = .8  AND  r = 1
0",.75,9,8
1140 DATA MED.DENT. TECHNOLOGY,"DENSITY(D) = M / V","FIND D  IF M
= 24.8 AND  V = 20","FIND V  IF  M = 2.72  AND D = 13.6", "FIND M
 IF  D = 3.6  AND  V = 12",1.24,.2,43.2
1150 DATA RECREATIONAL VEHICLES,"    D = R  X  T","FIND D  IF  R =
 40 AND T = 6","FIND R  IF  D = 594  AND  T = 11","FIND T  IF D =
300  AND  R = 15",240,54,20
1160 DATA BUILDING, " A = L X W","FIND A  IF  L = 24 AND W = 18","
FIND L  IF A =  300  AND  W = 15","FIND W  IF  A = 1000  AND L = 4
0",432,20,25
3999 GOSUB 6000
4000 CLS
4010 PRINT@30, "MENU"
4020 PRINT@275, "1";TAB(25); "AUTOMOTIVE"
4030 PRINT@339, "2";TAB(25); "BEAUTY CULTURE"
4040 PRINT@403, "3";TAB(25); "CLIMATE CONTROL"
4050 PRINT@467, "4";TAB(25); "ELECTRICAL"
4060 PRINT@531, "5";TAB(25); "MED. DENT.TECH."
4070 PRINT@595, "6";TAB(25); "REC. VECHICLES"
4080 PRINT@659, "7";TAB(25); "BUILDING TRADES"
4090 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
4095 GOSUB 7000
4100 CLS
4110 PRINT@262, "BELOW IS A FORMULA USED IN THE "C$(Q,1)" TRADE."
4115 PRINT@403,C$(Q,2)
4120 PRINT@515, "PLEASE COPY THIS FORMULA FOR USE IN THE NEXT THRE
E PROBLEMS!"
4130 GOSUB 6000
4140 CLS
4150 FOR N = 1 TO 3
4160 PRINT@277,C$(Q,N+2)
4170 PRINT@409," ";:INPUT "YOUR ANSWER";K$
4190 IF VAL(K$)=VAL(C$(Q,N+5)) THEN PRINT@725, "TERRIFIC ANSWER, "
A$:CT=CT+1:ELSE PRINT@720,"SORRY, THE CORRECT ANSWER IS "C$(Q,N+5)
4200 GOSUB 6000
```

```
4210 CLS
4220 NEXT
4230 CLS
4240 PRINT@384, "YOUR GRADE ON THE VOCATIONAL PART OF THE TEST IS"
(CT/3)*100" %"
4250 PRINT@512, "PLEASE SHOW THIS TO YOUR TEACHER BEFORE PRESSING
'C'"
4260 GOSUB 6000
4270 CLS
4280 PRINT@384, A$", IT HAS BEEN A PLEASURE WORKING WITH YOU!!!"
4290 GOTO 4290
5000 FOR N = 1 TO 1000:NEXT:RETURN
6000 PRINT@ 960, "PRESS C TO CONTINUE."
6001 I$=INKEY$:IFI$="C" THEN RETURN ELSE 6001
7000 '*************          MENU PROBLEMS      ******************
7010 FOR I=1 TO 7:FOR J = 1 TO 8:READ C$(I,J):NEXT:NEXT
7015 RETURN
```

SHOP FORMULAS

Peer Tutoring Reference Guide

Formulas are an important facet of everyday life. Knowing how to solve formulas and when to use formulas are expecially important in all vocational areas and industry. If you carefully follow these steps, you should have no problem:

1. write the formula to be used
2. substitute any known values
3. solve the equation
4. answer the question

EXAMPLE I

The depth (h) of gear toothis found by dividing the difference between the major (or larger) diameter and the minor (or smaller) diameter. In other words, the formula for the depth of a gear tooth is

$$h = \frac{D - d}{2}$$

If the major diameter is 6 and the minor diameter is 5.5, the depth is found by

1. write the formula

   $$h = \frac{D - d}{2}$$

2. substitute any known values into the formula

   $$h = \frac{6 - 5.5}{2}$$

3. solve the equation

   $$h = \frac{.5}{2} = .25$$

4. answer the question

   $$h = .25$$

EXAMPLE II

The circumference of a circle C is equal to its diameter d times π. (π ± 3.1416) In other words,

$$C = d\pi$$

If we know that the circumference of a hot tub is 15.708 feet, find its diameter.

1. write the equation

$$C = d\pi$$

2. substitute any known values

$$15.708 \text{ feet} = d \cdot 3.1416$$

3. solve the equation

$$\frac{15.708}{3.1416} = \frac{d \cdot 3.1416}{3.1416} = 5$$

4. answer the question

$$d = 5$$

SHOP FORMULAS

Worksheet I

1. $A = l \times w$

$A = 10$ sq. ft.

$w = 5$ ft.

$l =$ ________

2. $h = \frac{D - d}{2}$

$D = 10$ cm

$d = 6$ cm

$h =$ ________

3. $A = S^2$

$S = 6$ mm

$A =$ ________

4. $n = 21 \cdot l \cdot w \cdot h$

$l = 5'$

$w = 2'$

$h = 3'$

$n =$ ________

5. $P = 4s$

$s = 5$ yd.

$P =$ ________

6. $C = d\pi$ $(\pi = 3.1416)$

$C = 31.416$ cm

$d =$ ________

7. $P = 2 \cdot l + 2 \cdot w$

$l = 5$ m

$w = 2$ m

$P =$ ________

8. $A = \frac{1}{2} b \cdot h$

$b = 10$

$h = 7.2$

$A =$ ________

9. $I = P \times r \times T$

$P = \$4,000$

$r = 18\% = (.18)$

$T = 2$ yrs.

$I =$ ________

10. $A = r^2\pi$

$(\pi \doteq 3.1416)$

$r = 6$ cm

$A =$ ________

Application Word Problems

1. How many bricks are needed to build a wall 8' wide. 10' long and 4' high? The number of standard bricks needed to build a wall is approximately 21 times the volume of the wall.

$$n = 21 \cdot l \cdot w \cdot h$$

2. If the formula for the depth (h) of a gear tooth is the major diameter less the minor diameter divided by 2 and the major diameter is 10 cm and the minor diameter is 9, find the depth of the gear tooth.

$$h = \frac{D - d}{2}$$

3. The length of a doctor's office is 18 feet, the width is 22 feet. If area = length x width, find the area.

$$A = l \times w$$

4. A dryer at Silkies Salon has a diameter of 18". What is the circumference? ($\pi \doteq 3.1416$)

$$C = d \times \pi$$

5. 120 volts will send how large a current through a resistance of 2 ohms? Volts = amps x ohm

$$V = A \times O$$

6. A pipe has a length of 18 inches and a radius of 9 inches. Find the volume. $(\pi \doteq 3.1416)$

$$V = h \cdot r^2 \cdot \pi$$

7. A moped travels 30 mph. If the total distance is 180 miles, how many hours will it take to get to its distination?

Distance = rate x time

C = R x T

I. PROGRAM TITLE - "Ratio and Proportions"

II. PROGRAM DESCRIPTION
   - A. Students will view tutorial section (refer to Peer Tutoring Reference Guide).
   - B. Students will complete true proportions equating the product of the means to the product of the extremes.
   - C. Students will use proportions to solve various vocational application problems.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   - A. Peer Tutoring Reference Guide
   - B. Worksheet
   - C. Application Word Problems
   - D. Additional Sources
      1. Edwin I. Stein, Refresher Mathematics (Boston: Allyn and Bacon, 1980), pp. 510-511.
      2. Sadie C. Bragg et al., General Mathematics (Morristown, New Jersey: Silver Burdett, 1979), pp. 262-264.

V. SKILLS NEEDED

Addition, subtraction, multiplication and division of fractions, decimals, and whole numbers.

```
1 '*************************************************************
2 '**********        RATIO AND PROPORTION           ************
3 '**********             WRITTEN BY                ************
4 '**********  J. DALY,  M. MCALISTER, M.MCNEARNEY  ************
5 '**********  FOR COMPUTER ASS'T VOCATIONAL MATH   ************
6 '**********             APRIL 1981                ************
7 '*************************************************************
8 CLEAR500
9 DIMA1$(50),B1$(50),C1$(50),D1$(50),E1$(50),F1$(50),V$(21)
10 CLS:PRINT@512,;:INPUT"GOOD MORNING, WHAT IS YOUR NAME";A$
12 CLS:PRINT @256,"TODAY'S LESSON WILL BE ON"
14 PRINT CHR$(23):PRINT@525,"RATIO AND PROPORTION":PRINT CHR$(28)
16 PRINT@768,A$", WOULD YOU LIKE TO REVIEW";:INPUTB$
18 IF B$="YES" OR  B$ ="Y" THEN GOSUB 8000:CLS:PRINT@512,;:INPUT "
WOULD YOU LIKE TO REVIEW AGAIN";B$:IF B$="Y" OR  B$="YES" GOTO18
29 CLS
30 PRINT@256,"EXPRESS THE FOLLOWING RATIOS IN THEIR SIMPLEST FORM.
"
32 PRINT @384, "YOU MUST GIVE YOUR ANSWER IN TWO PARTS."
34 PRINT @448, "FIRST ENTER THE NUMERATOR AND THEN THE DENOMINATOR
."
36 PRINT@576,"FOR EXAMPLE, SIMPLIFY 12 TO 24 "
38 PRINT @640,"SINCE 12/24 SIMPLIFIES TO 1/2,
40 PRINT@704,"YOU WOULD ENTER 1 FOR THE NUMERATOR"
42 PRINT@768,"AND 2 FOR THE DENOMINATOR"
44 GOSUB6000
46 CLS
50 FORN=1 TO 10:READ A1$(N),B1$(N),C1$(N):NEXT:FOR N=11TO20:READ A
1$(N),B1$(N),C1$(N),D1$(N):NEXT:FOR N=26TO30 :READ E1$(N),F1$(N):N
EXT
60 FOR N=1TO10:CLS:PRINT@115,"PROB #"N
62       PRINT@340,"SIMPLIFY "A1$(N)
64       PRINT@468,;:INPUT"NUMERATOR";N1$
66       PRINT@596,;:INPUT"DENOMINATOR";D1$
68       IF VAL(N1$)=VAL(B1$(N)) AND VAL(D1$)=VAL(C1$(N)) PRINT@83
2,"CORRECT":C=C+1:ELSE PRINT @832,"SORRY, THAT IS NOT CORRECT, "A$
", THE CORRECT ANSWER IS "B1$(N)"/"C1$(N)
70       GOSUB6000
72 NEXT
73 N = N-1
75 CLS:PRINT @256, "IN THIS SECTION YOU WILL HAVE TO FIND THE PITC
H OF A ROOF."
77 PRINT@390,"REMEMBER THE FORMULA IS PITCH = RISE / SPAN"
79 PRINT@512,"FOR EXAMPLE, IF THE RISE = 4 FT AND THE SPAM = 8 FT
80 PRINT @581, "THE PITCH WOULD BE 4 / 8  OR  1 / 2"
82 PRINT@716, "REMEMBER TO MAKE SEPARATE ENTRIES FOR THE
             NUMERATOR AND DENOMINATOR"
84 GOSUB6000
85 CLS
88 FOR N=11TO20:CLS:PRINT@115,"PROB #"N
```

```
90        PRINT @340, "RISE = "A1$(N) " , RUN = "B1$(N)
94        PRINT @468,;:INPUT "NUMERATOR";N1$
96        PRINT @596,;:INPUT "DENOMINATOR";D1$
98        IF VAL(N1$)=VAL(C1$(N)) AND VAL(D1$)=VAL(D1$(N)) PRINT@
        832,"CORRECT":C=C+1:ELSE PRINT @832,"SORRY, THAT IS NOT CO
RRECT, "A$", THE CORRECT ANSWER IS " C1$(N)" / "D1$(N)
100       GOSUB6000
102       CLS
104 NEXT
105 N = N-1:CLS
106 PRINT @256,"THIS NEXT SECTION IS ON SCREW THREADS"
108 PRINT@320,"IF YOU HAVE NOT ALREADY DONE SO, COPY THESE FORMULA
S":Z=2:GOSUB8542
110 PRINT:PRINT"WHEN FINDING THE DEPTH OF THE THREAD EXPRESS YOUR
ANSWER CORRECT TO 4 DECIMAL PLACES."
112 GOSUB6000
113 CLS
114 PRINT@115, "PROBLEM #21":N=21
116 PRINT@256, "FOR AN AMERICAN NATIONAL STANDARD THREAD, FIND THE
 DEPTH IF      THERE ARE 13 THREADS PER INCH";:INPUTA1
118 IF A1 =.0500 THEN PRINT @512, "YOU REALLY KNOW YOUR FORMULAS.
 KEEP UP THE GOOD WORK.":C=C+1:ELSE PRINT@512, "SORRY, THE CORRECT
 ANSWER IS .0500, PLEASE CHECK YOUR FORMULAS."
120 GOSUB6000
122 CLS
124 PRINT@115, "PROBLEM #22":N=22
126 PRINT@256, "FOR AN AMERICAN NATIONAL STANDARD THREAD, FIND THE
 DEPTH IF       THERE ARE 40 THREADS PER INCH";:INPUTA1
128 IF A1=.0162 THEN PRINT @512, "MATH MUST BE YOUR FAVORITE SUBJE
CT.":C=C+1:ELSE PRINT @512,"SORRY, THE CORRECT ANSWER IS .0162.  C
HECK YOUR WORK."
130 GOSUB6000
132 CLS
134 PRINT@115,"PROBLEM #23":N=23
136 PRINT@256, "FIND THE NUMBER OF THREADS PER IN IF THE DEPTH IS
.027 IN";:INPUTA1
138 IF A1=24 THEN PRINT@512, "HAVE YOU CONSIDERED ENGENEERING FOR
A CAREER?":C=C+1:ELSE PRINT @512, "SORRY, THE CORRECT ANSWER IS 24
."
140 GOSUB6000
142 CLS
144 PRINT@115,"PROBLEM #24":N=24
146 PRINT@256,"IN AN ACME SCREW, THE NUMBER OF THREADS PER INCH IS
 25. FIND THE DEPTH.";:INPUTA1
148 IF A1=.03 THEN PRINT@512, "YOU'RE A CANDIDATE FOR MATH STUDENT
 OF THE MONTH.":C = C+1:ELSE PRINT@512, "SORRY, THE CORRECT ANSWER
 IS .03"
150 GOSUB6000
152 CLS
154 PRINT@115,"PROBLEM #25":N=25
156 PRINT@256,"IN A SQUARE THREAD, THE NUMBER OF THREADS PER INCH
IS 36. FIND THE DEPTH.";:INPUTA1
```

```
158 IF A1=.0139 THEN PRINT @512, "YOU MUST BE AN A STUDENT IN MATH
 CLASS.":C=C+1:ELSE PRINT@512, "SORRY THE CORRECT ANSWER IS .0139"
160 GOSUB 6000
162 CLS
170 FOR N=26 TO 30:PRINT @110,"PROBLEM # "N
172 PRINT@448,"SOLVE THE FOLLOWING PROPORTION  " E1$(N); :INPUT"
THE VARIABLE = ";F$
174 IF F$ = F1$(N) THEN PRINT@768, "CORRECT":C = C+1:ELSE PRINT@76
8, "SORRY, THE CORRECT ANSWER IS "F1$(N)
176 GOSUB 6000
178 CLS
180 NEXT
181 N=N-1
182 CLS
184 GOSUB 5000
4000 C =0:CLS
4010 PRINT@30, "MENU"
4020 PRINT@275,"1";TAB(25);"AUTOMOTIVE"
4030 PRINT@339,"2";TAB(25);"BEAUTY CULTURE"
4040 PRINT@403,"3";TAB(25);"CLIMATE CONTROL"
4050 PRINT@467,"4";TAB(25);"ELECTRICAL"
4060 PRINT@531,"5";TAB(25);"MED.DENT.TECHNICIAN"
4070 PRINT@595,"6";TAB(25);"REC. VEHICLES"
4090 PRINT@659,"7";TAB(25);"BUILDING TRADES"
4095 PRINT@840, " ";:INPUT "ENTER THE NUMBER OF YOUR VOCATIONAL FI
ELD";Q
4100 CLS
4110 PRINT@128,"IN THIS PART, YOU WILL DO TWO TYPES OF PROBLEMS WI
TH PROPORTIONS"
4120 PRINT@260, "1. FINDING THE COSTS OF A NUMBER OF ITEMS IN YOUR
 FIELD."
4130 PRINT@388, "2. FINDING THE TIME IT TAKES TO DO A NUMBER OF JO
BS."
4140 PRINT@512, "FOR EXAMPLE - 4 LUBRICATION JOBS TAKE 9 HOURS TO
COMPLETE.                       HOW LONG DOES IT TAKE TO DO 15 LUB
ES?"
4145 FOR N = 1 TO 500:NEXT
4150 PRINT@704, "TO FIND THE MISSING TIME, WE MUST SOLVE   4/9 = 1
5/N"
4160 PRINT@832, "CROSS MULTIPLICATION GIVES US   4N = 135"
4170 PRINT@896,"THEREFORE,                       N = 33 3/4 HRS."
4180 GOSUB 6000
4190 CLS
4200 FOR N= 1 TO 21:READ V$(N):NEXT
4205 A = RND(10):B = RND(5)*A:C=RND(20)+A
4210 PRINT@128, "TO DO"A""V$(Q)", IT REQUIRES"B"HOURS."
4220 PRINT@256, "HOW LONG WILL IT TAKE TO DO"C"JOBS";:INPUT D
4230 GOSUB 10500
4240 GOSUB 6000
4250 CLS
4255 A=RND(30)+5:B=RND(10)+2:C=RND(50)+2
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4260 PRINT@128, "IT TAKES"A"HOURS TO DO"B" "V$(Q+7)"."
4265 PRINT@256,"(ROUND OFF ANSWER TO HUNDREDTHS IF NECESSARY)"
4270 PRINT@384, "HOW MANY JOBS CAN YOU DO IN"C"HOURS";:INPUT D
4280 GOSUB 10500
4290 GOSUB 6000
4300 CLS
4304 A =RND(20)+5:B =100+RND(99):C=RND(20)+A
4306 U$="$$###.##"
4310 PRINT@128, A" "V$(Q+14)" COST ";:PRINT USING U$;B
4320 F=1:PRINT@257, "HOW MUCH WILL IT COST FOR"C"JOBS";:INPUT D$
4330 GOSUB 10700
4340 GOSUB 6000
4350 CLS
4360 PRINT@384, "YOUR SCORE ON THE VOCATIONAL PART IS"(C5/3)*100"
%"
4370 PRINT@512, "PLEASE LET THE TEACHER SEE THIS GRADE FOR THE REC
ORDS."
4380 GOTO 4380
5000 CLS:PRINT@512,A$ " YOU HAVE" C" PROBLEM/S CORRECT OUT OF"N" C
ORRECT FOR A SCORE OF"(C/N)*100"%":PRINT @640, "ENTER R TO RETURN,
 M TO GOTO MENU"
5001 INPUTM$
5002 IF M$="R"RETURN
5003 GOTO4000
6000 PRINT @960,"PRESS C TO CONTINUE"
6001 I$=INKEY$
6002 IF I$="C" RETURN
6003 IFI$="S" GOSUB5000:RETURN
6004 GOTO6001
6500 I1$=INKEY$:IF I1$=" " RETURN ELSE 6500
8000 CLS:PRINT"                    PLEASE PRESS SPACE BAR TO CONTINUE"
8002 PRINT:PRINT STRING$(24,CHR$(92))
8004 PRINT:PRINT"                                     ";:PRINTSTRING$(36,CHR
$(155))
8006 GOSUB6500
8008 PRINT:PRINT "WE CAN SEE THAT THE RATIO OF ARROWS TO TEETH IN
THE COMB IS      24 TO 36, OR 24 : 36, OR 24/36 = 2/3
8010 GOSUB6500
8012 PRINT:PRINT "MANY MIXTURES ARE GIVEN IN TERMS OF RATIOS - SUC
H AS CONCRETE"
8014 GOSUB 6500
8016 PRINT:PRINT"FOR EXAMPLE, A 1:2:4 MIXTURE FOR THE BASE COAT CO
NSISTS OF       1 PART CEMENT, 2 PARTS SAND, AND 4 PARTS CRUSHED RO
CK.         A 1:2 FINISH COAT CONSISTS OF 1 PART CEMENT AND 2 PAR
TS SAND."
8018 GOSUB 6500
8020 CLS: PRINT"  AS THESE EXAMPLES SHOW A"
8022 PRINT CHR$(23):PRINT@152,"RATIO":PRINT CHR$(28)
8024 PRINT@256," IS A COMPARISON OF NUMBERS BY DIVISION"
8026 GOSUB 6500
8028 PRINT @384," RATIOS ARE USUALLY WRITEN AS A FRACTION LIKE 2/3
."
8030 GOSUB 6500
```

```
8032 PRINT @448, " ALTHOUGH, SOMETIMES T
HEY ARE WRITTEN 2:3 OR 2 TO 3
8034 GOSUB6500
8036 PRINT @576,"          RATIOS OCCUR WIDELY IN INDUSTRY AND TH
E TRADES."
8038 GOSUB6500
8040 PRINT @768, A$ ", LET'S LOOK AT SOME EXAMPLES.":GOSUB6500:CLS
8041 PRINT@225,"WHAT IS THE RATIO OF THE ";:PRINT @289,"THE RADIUS
 OF PULLY A TO";:PRINT@353,"THE RADIUS OF PULLEY B?";
8042 PRINT @481,"RADIUS OF PULLEY A ";:PRINT@545,STRING$(17,CHR$(9
5));:PRINT@609,"RADIUS OF PULLEY B";
8043 PRINT @740, "= 6/9 = 2/3";
8044 PRINT CHR$(23):PRINT@283,"A";:PRINT@796,"B";:PRINTCHR$(28)
8500 SET(30,8):SET(23,9.6):SET(37,9.6):SET(19,12.2):SET(41,12.2):S
ET(23,16.8):SET(37,16.8):SET(30,17.4)
8502 FORX=30TO38STEP2:SET(X,12.7):NEXT
8504 SET(30,29):SET(18,32):SET(42,32):SET(13,37):SET(21,42):SET(41
,42):SET(30,44)
8506 FOR X=30TO47STEP2:SET(X,37):NEXT
8507 GOSUB6500:CLS
8510 PRINT "       THE PITCH, OR STEEPNESS OF A ROOF IS THE RATIO
 OF"
8512 PRINT:PRINTCHR$(23):PRINT"      THE RISE TO THE SPAN":PRINTCH
R$(28)
8514 PRINT@468,"PITCH = RISE / SPAN";
8516 PRINT@623,CHR$(91);:PRINT@685,"RISE";:PRINT @751,CHR$(92);
8517 PRINT @854,STRING$(5,CHR$(95));:PRINT" SPAN ";:PRINTSTRING$(5
,CHR$(95))
8520 Y=25:FOR X=60 TO 80:SET(X,Y):Y=Y+.5:NEXT
8522 Y=25:FOR X=60 TO40STEP-1:SET(X,Y):Y=Y+.5:NEXT
8524 FOR X=40 TO 80:SET(X,35):NEXT
8525 GOSUB6500:CLS
8530 PRINT"SCREW THREADS ARE DESIGNED TO MEET A VARIETY OF INDUSTR
IAL NEEDS"
8532 PRINT:PRINT"THREE COMMON SCREW THREADS ARE"
8534 PRINT"                     AMERICAN NATIONAL STANDARD THREAD"
8536 PRINT"                     SQUARE THREAD"
8538 PRINT"                     ACME THREAD"
8542 PRINT:PRINT"     AMERICAN NATIONAL STANDARD     D = 0.6495/N
8544 PRINT"     SQUARE                          D = 0.5000/N
8546 PRINT"     ACME                            D = 0.500/N + 0.01
8547 IF Z=2 RETURN
8548 PRINT"                 COPY DOWN THESE FORMULAS"
8550 GOSUB6500:CLS
8555 PRINT"SCREWS ARE MATCHED TO FINE TOLERANCES. THEREFORE, A MAC
HINIST   MUST BE FAMILIAR WITH THESE FORMULAS IN ORDER TO SET THE
       CONTROLS ON THE THREADING LATHE."
8556 GOSUB6500
8558 PRINT:PRINT"EXAMPLE        WHAT MUST THE DEPTH SETTING ON A L
ATHE TO        MANUFACTURE AN AMERICAN NATIONAL STANDARD SCREW HAV
ING 12       THREADS PER INCH?"
8560 GOSUB6500
```

```
8562 PRINT:PRINT"SOLUTION        D = .6495 /N"
8564 PRINT:PRINT"                  = .6495/12"
8566 PRINT:PRINT"                  = .0541
8568 PRINT:PRINT"THE THREAD DEPTH MUST BE APPROXIMATELY .0541 INCH
ES."
8570 GOSUB6500:CLS
8572 PRINT:PRINTCHR$(23):PRINT"        PROPORTIONS":PRINTCHR$(28
)
8573 GOSUB6500
8574 PRINT@ 260,"A STATEMENT THAT TWO RATIOS ARE EQUAL IS A PROPOR
TION."
8576 GOSUB6500
8578 PRINT @388, "FIRST TERM / SECOND TERM = THIRD TERM / FOURTH T
ERM"
8580 GOSUB6500
8582 PRINT @516,"THE TERMS OF A PROPORTION HAVE SPECIAL NAMES.":GO
SUB6500
8584 PRINT@653,"EXTREME / MEAN = MEAN / EXTREME"
8586 GOSUB6500
8588 PRINT @778,"IN A PROPORTION THE PRODUCT OF THE MEANS IS EQUAL
 TO            THE PRODUCT OF THE EXTREMES.
8590 FOR X=15TO126:SET(X,33):SET(X,42):NEXT:FOR Y=33 TO 42:SET(15,
Y):SET(126,Y):NEXT
8592 GOSUB6500:CLS
8594 PRINT"EXAMPLE            SOLVE 7 / X = 21 / 24
8595 GOSUB6500
8596 PRINT:PRINT"                   21X = 7 X 24
8597      PRINT"                    21X = 168
8598      PRINT"                      X = 8
8599 GOSUB6500
8600 PRINT:PRINT"EXAMPLE       A PATTERN FOR A RECTANGULAR END TA
BLE"
8602      PRINT"               IS PRINTED IN A BOOK.  THE PATTERN
8604      PRINT"               MEASURES 7 IN. BY 10 1/2 IN.  IF T
HE
8606      PRINT"               FINISHED TABLE IS TO BE 17 1/2 IN.
,
8608      PRINT"               WHAT WILL BE THE FINISHED LENGTH?"
8609 GOSUB6500
8610 PRINT:PRINT"             7 / 17 1/2 = 10 1/2 / L
8612      PRINT"              7 L = 10 1/2 X 17 1/2 (MEANS, EXTRE
MES)"
8614      PRINT"                L = (10 1/2 X 17 1/2 )/ 7
8616      PRINT"                L = 26 1/4
8618 PRINT:     PRINT"             THE TABLE WILL BE 26 1/4 IN LO
NG.
8620 GOSUB6500:CLS
8622 PRINT:PRINTCHR$(23):PRINT"      INVERSE PROPORTIONS":PRINTCH
R$(28)
8624 PRINT@320,"A PROPORTION IN WHICH THE RATIOS ARE BASED ON RECI
PROCAL       RELATIONSHIPS IS CALLED AN INVERSE PROPORTION."
8625 GOSUB6500
```

```
8626 PRINT@512,"FOR EXAMPLE, THE SPEED AT WHICH A PAIR OF GEARS TU
RN IS          INVERSELY RELATED TO THE NUMBER OF TEETH IN THE GEAR
S."
8628 PRINT@704,"SPEED OF GEAR A / SPEED OF GEAR B = # TEETH IN GEA
R B / # TEETH IN GEAR A
8630 PRINT@832,"                        PLEASE COPY DOWN THIS FORMULA"
8650 GOSUB6500:CLS:RETURN
9000 GOTO 9000
10000 DATA 18 TO 24,3,4,3 TO 30, 1,10,3 TO 12,1,4, 2 TO 3 1/2,4,7,
4 TO 18,2,9
10001 DATA 2 TO 1.5,4,3,9 TO 24,3,8,3 TO 6,1,2,15 TO 100,3,20
10002 DATA 3 TO 1.5,2,1
10003 DATA 8,20,2,5,6,24,1,4,6,18,1,3,5 FT, 22 FT 6 IN,2,9,4 1/2 F
T,20 FT 3 IN,2,9
10004 DATA 1.5,7.5,1,5
10005 DATA 1.2,8.4,1,7,1.6,6.4,1,4,1.75,10.5,1,6,.95,3.8,1,4
10006 DATA 3/Y = 9/21,7,7/8 = L/24,21,3/8 = 12/P,32,5/4.5 = Y/27,3
0,.75/150 = 2/S,400
10010 DATA ENGINE LUBRICATIONS,PERMANENTS,CENTRAL AIR INSTALLATION
S,REWIRINGS,BLOOD ANALYSES,MOPED TUNEUPS,STAIRCASE INSTALLATIONS
10020 DATA ENGINE TUNEUPS,MANICURES,FURNACE OVERHAULS,INSTALLATION
S OF OUTLETS,URINE CULTURE ANALYSES,FRONT END ALIGNMENTS,WINDOW IN
STALLATIONS
10030 DATA VALVE REPLACEMENTS,EYEBROWS WAXINGS,GAS HEAT CONVERSION
S,INSTALLATION OF LIGHT FIXTURES,TEETH CLEANINGS,VENT INSTALLATION
S,SPACKLING JOBS
10500 '***************        MENU SCORING      ********************
10510 E=(B*C)/A:E$=STR$(E):D$=STR$(D):El=(INT((VAL(E$)+.005)*100))
/100:El$=STR$(El)
10515 IF VAL(D$)=VAL(El$) THEN PRINT@704, "YOU ARE TERRIFIC, "A$:C
5 = C5+1:ELSE PRINT@704, "SORRY THE CORRECT ANSWER IS"El
10517 RETURN
10700 IF LEFT$(D$,1)="$" THEN D$=RIGHT$(D$,(LEN(D$)-1))
10710 E =(B*C)/A:E$=STR$(E):El=(INT((VAL(E$)+.005)*100))/100:El$=S
TR$(El)
10720 IF VAL(D$)=VAL(El$) THEN PRINT@704, "YOU ARE GREAT, "A$:C5 =
C5+1:ELSE PRINT@704,"tHE CORRECT ANSWER IS ";:PRINT USING U$;El
10721 RETURN
```

RATIO AND PROPORTIONS

Peer Tutoring Reference Guide

Ratio is a comparison of two numbers by division.

The ratio of 4 to 5 quite simply is:

$$\frac{4}{5} \qquad 4:5 \qquad \text{or 4 to 5}$$

(4 is to 5)

We often compare one object to another. For example, food to people.

$$\frac{\text{8 pork chops}}{\text{4 people}}$$

or tires to car $\frac{\text{4 tires}}{\text{1 car}}$

or air conditioning to footage $\frac{\text{120 volts}}{\text{4000 BTU/hrs.}}$

Proportion is a relation of equality of two ratios such as

$$\frac{4}{2} = \frac{10}{5}$$

In other words, the comparison of two equivalent fractions.

EXAMPLE I

$$\frac{\text{4 tires}}{\text{1 car}} = \frac{\text{20 tires}}{\text{x cars}}$$

Let's take a minute to review some terminology.

$$\frac{a}{b} = \frac{c}{d} \qquad \frac{\text{extremes}}{\text{means}} = \frac{\text{means}}{\text{extremes}}$$

a and d are extremes; b and c are means

The product of the extremes = the product of the means

$$\begin{aligned} a \cdot d &= b \cdot c \\ 4x &= 20 \\ x &= 5 \end{aligned}$$

If we plug the 5 back into the equation:

$$\frac{4}{1} = \frac{20}{5}$$

We see that we have equivalent fractions.

EXAMPLE II

If one BTU = 252 calories, then 5000 BTU = _____ calories.

$$\frac{\text{BTU}}{\text{calories}} = \frac{\text{BTU}}{\text{calories}}$$

$$\frac{1}{252} = \frac{x}{12{,}600}$$

Again, we recall that the product of the means
=
the product of the extremes

$$252\ x = 12{,}600$$

Now we divide both sides by 252 and

$$x = 500$$

RATIO AND PROPORTIONS

Worksheet

1. $\frac{4}{10} = \frac{x}{40}$ $x =$ __________

2. $\frac{6}{7} = \frac{54}{x}$ $x =$ __________

3. $\frac{81}{180} = \frac{x}{40}$ $x =$ __________

4. $\frac{5}{8} = \frac{x}{32}$ $x =$ __________

5. $\frac{9}{27} = \frac{x}{135}$ $x =$ __________

6. $\frac{4}{96} = \frac{22}{x}$ $x =$ __________

7. $\frac{n}{45} = \frac{9}{15}$ $n =$ __________

8. $\frac{2.2}{4.8} = \frac{c}{1.2}$ $c =$ __________

9. $\frac{.2}{.16} = \frac{c}{.01}$ $c =$ __________

10. $\frac{9}{90} = \frac{2}{x}$ $x =$ __________

11. $\frac{400}{x} = \frac{400}{10}$ $x =$ __________

12. $\frac{18}{14} = \frac{27}{x}$ $x =$ __________

13. $\frac{4}{6} = \frac{6}{x}$ $x =$ __________

14. $\frac{6}{a} = \frac{2\frac{1}{2}}{5\frac{1}{5}}$ $a =$ __________

15. $\frac{8}{150} = \frac{70}{x}$ $x =$ __________

16. $\frac{3.5}{175} = \frac{5.7}{y}$ $y =$ __________

17. $\frac{.005}{x} = \frac{14}{28}$ $x =$ __________

18. $\frac{9}{12} = \frac{3}{x}$ $x =$ __________

19. $\frac{4}{7} = \frac{2\frac{1}{2}}{x}$ $x =$ __________

20. $\frac{9.2}{18.4} = \frac{47820}{x}$ $x =$ __________

RATIO AND PROPORTIONS

Application Word Problems

1. If one auto mechanic can complete 6 jobs in a week, 8 mechanics working at the same rate can complete how many jobs?

2. If 4 bags of concrete are needed for 3 jobs, how many bags of concrete will be needed for 15 jobs?

3. If 1½ oz. of shampoo is needed for one customer, how much shampoo is needed for 12 customers?

4. If 700' of sewer pipe is needed for 6 hook-ups, how much pipe is needed for 20 hook-ups?

5. If 8 cg of silver is needed for 3 fillings, how much silver is needed for 5 fillings?

I. PROGRAM TITLE - "Graphing"

II. PROGRAM DESCRIPTION
   A. Students will view a brief tutorial section on the various types of graphs and their uses.
   B. Students will answer questions dealing with specific graphs.
   C. This program is data based.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
   A. Peer Tutoring Reference Guide
   B. Worksheets
      1. Bar Graph with related questions
      2. Line Graph with related questions
      3. Circle Graph with related questions
   C. Additional Sources
      1. Mervin L. Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), pp. 370-372.
      2. Sadie C. Bragg et al., General Mathematics (Morristown, New Jersey: Silver Burdett Co., 1979), pp. 396-401.

IV. SKILLS NEEDED

Finding the percent of a number, multiplication of whole and decimal numbers.

```
3 CLEAR500
5 DIMKI(12),K(12)
6 '*************   READING GRAPHS           *******************
7 '*************   WRITTEN BY               *******************
8 '*************   J DALY                   *******************
9 '*************   M MCALISTER              *******************
10 '************   M MCNEARNEY              *******************
11 '************   FOR COMP. ASST. VOC MATH *******************
12 '***********************************************************
13  CLS:PRINT @512,"GOOD MORNING, TODAY'S TOPIC IS READING GRAPHS.
                   WHAT IS YOUR NAME";:INPUTA$
14 CLS:PRINT @512, "WOULD YOU LIKE SOME INFORMATION ABOUT READING
GRAPHS";:INPUT A4$
15 IF A4$="Y" OR A4$="YES" GOSUB 7000
16 CLS
90 PRINT @89,"TEMPERATURE JULY 4"
95 DATA D,E,G,R,E,E,S
100 FOR N=0TO6:READA$(N):PRINT@(258+64*N),A$(N):PRINT@(266+64*N),(
90-5*N):PRINT@(271+64*N),(STRING$(49,CHR$(95))):NEXT
105 FORK=0 TO 7
110 FOR I=32+10*K TO 37+10*K:FOR J=27TO30:SET(I,J):SET(I,(J-(1.5*K
))):NEXT:NEXT
111 NEXT
112 FORK=0TO3:FOR I=72+10*K TO 77+10*K:FOR J=20TO30:SET(I,J):NEXT:
NEXT:NEXT
113 FORI=62TO67:FORJ=25TO30:SET(I,J):NEXT:NEXT
115 FORI=112 TO 117:FOR J=17 TO 30:SET(I,J):NEXT:NEXT
120 FOR I=122 TO127:FOR J=18 TO 30:SET(I,J):NEXT:NEXT
130 FOR X=8 TO 12: PRINT@(720+L),X:L=L+5:NEXT
140 FOR X=1TO5:PRINT@(720+L),X:L=L+5:NEXT
150 PRINT@796,"A.M.":PRINT@818,"P.M."
160 DATA 81,83,86,85,83,0,0,68,72,73,76,80
165 FOR N=1TO12:READK(N):NEXT
288 FOR N=1TO12:KI(N)=N:NEXT:KI(6)=0:KI(7)=0
289 FORQ=1 TO 10
290 X=RND(12)
291 IF KI(X)=0 THEN GOTO 290
292 KI(X)=0
300 PRINT@835,"WHAT WAS THE TEMP AT"X"                            ";:INPUT"
  ";K$
305 PRINT @835,"
      "
310 GOSUB400
320 GOSUB6000
325 PRINT@960,"                                                ";
330 NEXT
```

```
335 GOTO410
400 PRINT@835,"                                        ";:IF VAL(K$)
=K(X) PRINT @835,"CORRECT";:C=C+1:RETURN:ELSE PRINT @835,"SORRY TH
E CORRECT ANSWER IS        "K(X);:RETURN
410 GOSUB6000
420 CLS: PRINT @512,A$", YOUR SCORE IS," (C/10)*100 "% FOR THIS SE
CTION."
430 GOSUB 6000
599 CLS
600 FOR K=0TO6:PRINT@(64+K*128),(6-K);:NEXT
605 FOR L=0TO6:PRINT@(832+7*L),L;:NEXT
610 PRINT @178,"IN THE GRID ";
611 PRINT @242,"ON THE LEFT ";
612 PRINT @306,"THE BLANKS ";:PRINT @370,"REPRESENT"
613 PRINT @434,"ORDERED PAIRS "
630 FOR K=1TO6:FOR X=7TO84:IF X=5+13*K OR X=6+13*K THEN NEXTELSESE
T(X,(6*K-2)):NEXT:NEXT
635 FOR K=0TO6:FORY=4TO38:IF Y=6*K-2 THEN NEXT ELSESET((5+13*K),Y)
:SET((6+13*K),Y):NEXT:NEXT
637 PRINT @896,"PLEASE ENTER THE ORDERED PAIRS FOR EACH BLANK FROM
 LEFT TO RIGHT"
640 C=0
645 FOR N=1TO 6
647 READ H(N),V(N)
650 PRINT @896,"
  "
652 PRINT @896,"POINT"N ;:INPUT"    HORIZONTAL";A(N)
653 PRINT@926,;:INPUT"VERTICAL";B(N)
655 IF A(N)=H(N) AND B(N)=V(N) THEN PRINT @896,"SENSATIONAL WORK
                        ":C=C+1:FOR K=1TO1200:NEXT:ELSE PRINT @896
,"SORRY THE CORRECT ANSWER IS               ("H(N)","V(N)")";:FOR
K=1TO1200:NEXT
670 NEXT
680 CLS:PRINT @512, A$,"YOUR SCORE IS "(C/6)*100"%"
690 GOSUB 6000
700 CLS:PRINT @512,"GOODBYE "A$", HAVE A NICE DAY"
6000 PRINT@960,"PRESS C TO CONTINUE";
6001 I$=INKEY$:IFI$="C" THEN RETURN ELSE 6001
7000 CLS:PRINT "          PLEASE PRESS SPACE BAR TO CONTINUE"
7002 PRINT
7003 PRINT"THERE ARE VARIOUS TYPES OF GRAPHS.  LET'S LOOK AT SOME
OF THEM  AND HOW THEY ARE USED.":GOSUB8000
7004 PRINT
7005 PRINT"                     LINE GRAPHS       "
7006 PRINT
7007 PRINT" TWO AXES ARE USED IN LINE GRAPHS. VERTICAL READINGS  G
IVE ONE    PIECE OF INFORMATION, WHILE HORIZONTAL READINGS GIVE AN
OTHER.
```

```
7008 GOSUB8000
7010 PRINT
7012 PRINT"                     CIRCLE GRAPHS
7014 PRINT
7016 PRINT"THIS GRAPH IS OFTEN USED WHEN WE WANT TO DIVIDE A WHOLE
 INTO    PARTS OR PERCENTS.  THE ENTIRE CIRCLE REPRSENTS 100%.
7018 GOSUB 8000
7020 PRINT
7022 PRINT "                     BAR GRAPHS
7024 PRINT"
7026 PRINT"BAR GRAPHS ARE MUCH THE SAME AS LINE GRAPHS ONLY NOT AS
 SPECIFIC SINCE THE HORIZONTAL LINE OFTEN DEALS WITH GENERALITIES.
7028 GOSUB8000
7030 PRINT
7032 PRINT"                 NOW ON TO THE QUIZ
7034 GOSUB8000
7036 RETURN
8000 L$=INKEY$:IF L$=" " THEN RETURN ELSE 8000
9000 DATA 1,6,2,5,3,4,4,3,5,2,6,1
```

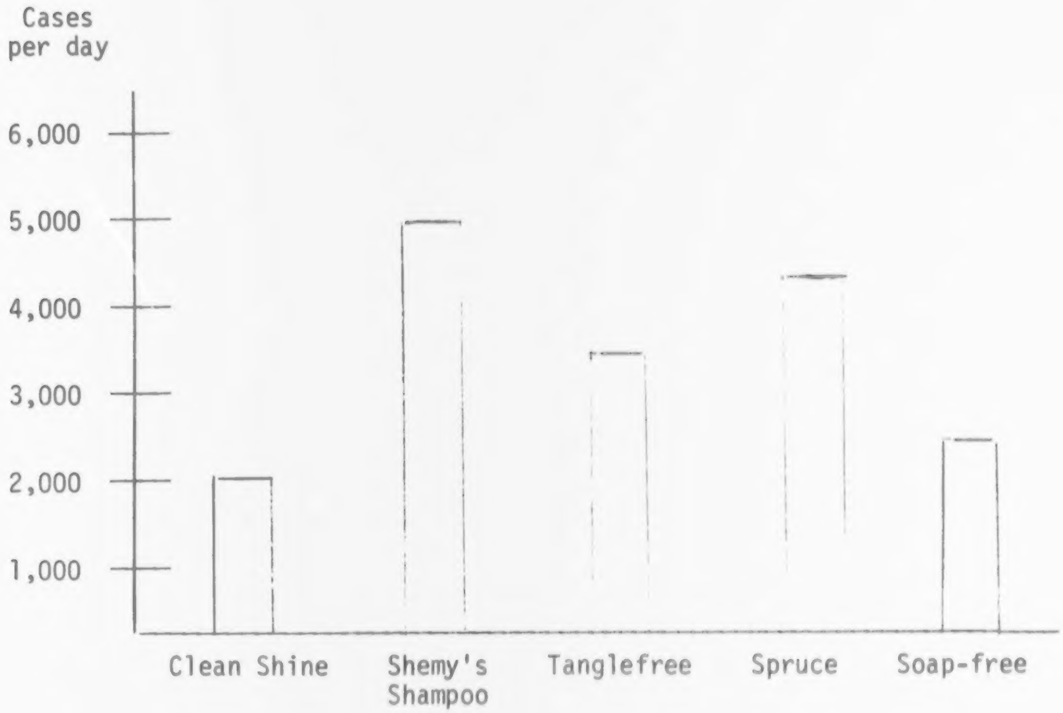
GRAPHING

Peer Tutoring Reference Guide

Graphing - A graph can be looked at as a picture that presents information. There are many types of graphs.

EXAMPLE I

This is a BAR GRAPH



Information is given on the vertical axis and the horizontal axis. One piece of information-the bar graph often does not need to be connected with another piece of information.

First, We must name the graph or give it a title -- "Shampoo Sold Per Day"

Second, What information is given along the bottom line of the graph?
"Brand Names of Shampoo"

Third, What information is given along the side of the graph?
"Cases Sold Per Day"

Fourth, What does each vertical space stand for?
"1,000 cases"

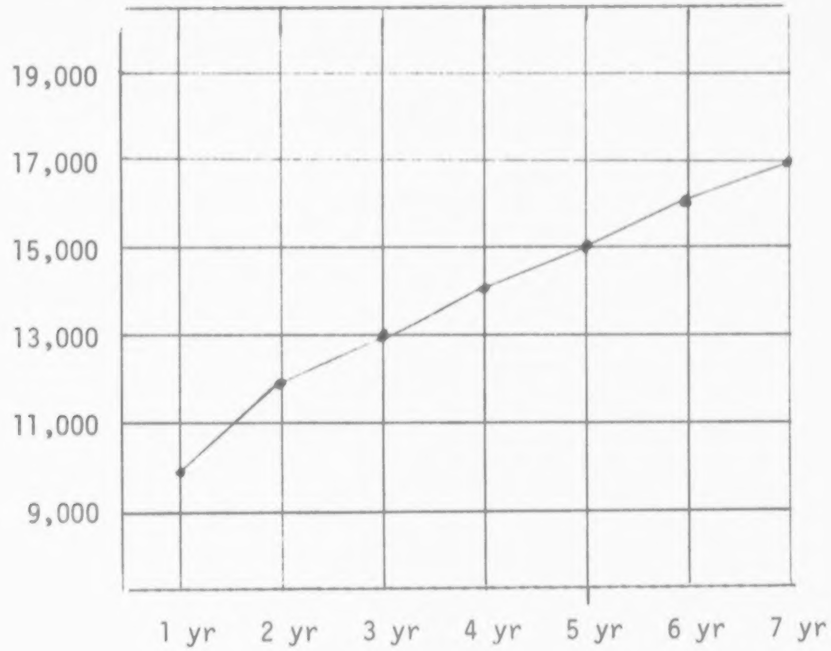
There is much information that can be gotten from the graph. We could find which shampoo was the largest seller and which was the least in demand.

EXAMPLE II

This is a LINE GRAPH

A line graph is obtained by connecting key points of information.

WITH MORE EXPERIENCE
YEARLY INCOME CLIMBS



First, What is the title of this graph?
"With More Experience Yearly Income Climbs"

Second, What information is given along the bottom line of the graph?
"Years of Experience"

Third, What information is given along the side of the graph?
"Average Annual Income"

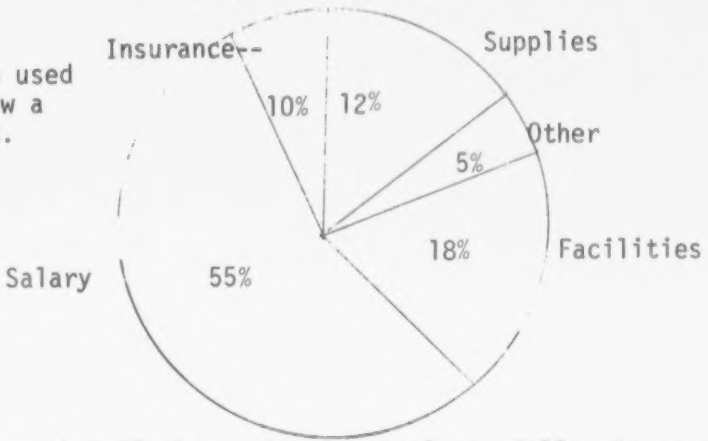
Fourth, What is the difference between 1 year experience and 4 years experience?
" $4,000 "

Again, much information can be gained from a graph.

EXAMPLE III

This is a CIRCLE GRAPH

These are often used when telling how a dollar is spent.



This graph tells how a local school tax dollar is spent. When we see 55%, this means 55¢ out of each dollar is spent on Salary. When we see 12%, this means that 12¢ out of each dollar is spent on Supplies.

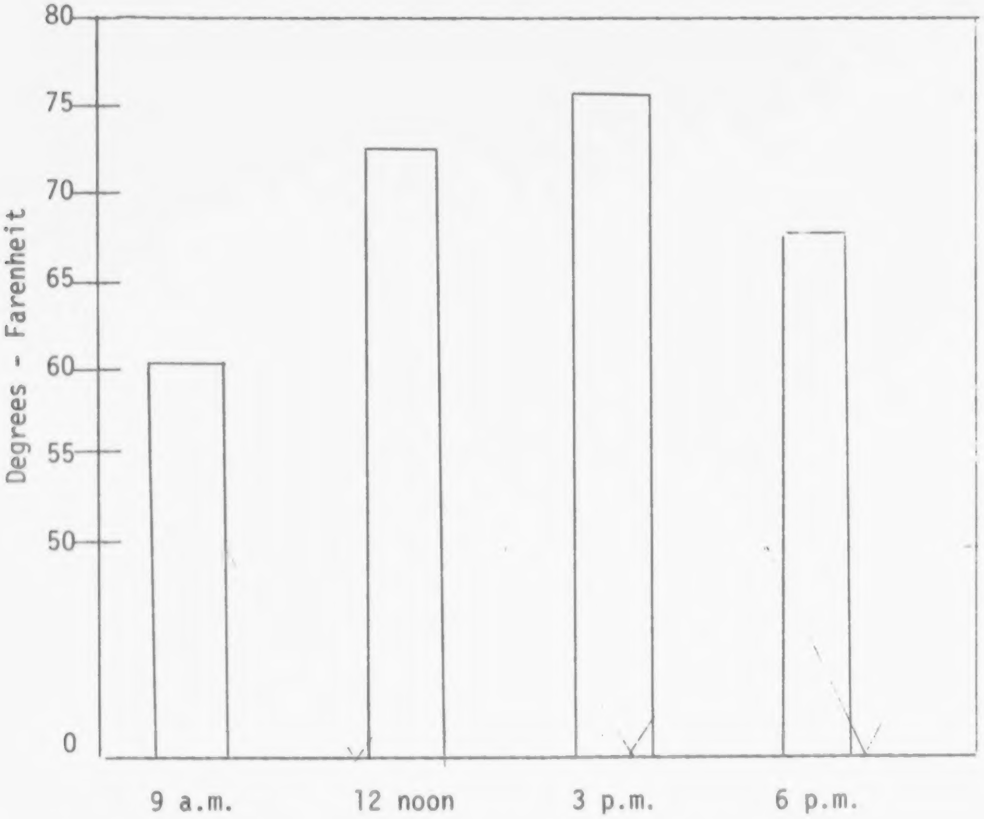
If we were given that the total School Tax collected was $720,000, we could find out how much was spent on insurance by multiplying

$720,000 x .05 (5%)

There are many other ways to use graphs. However, we have looked briefly at graphs and should now have a basic understanding of how they work.

GRAPHING

Worksheet I


PLANT TEMPERATURE

From the graph above, determine the given information:

1. What is the name of this graph? ______________________________

2. What was the temperature at 9 a.m.? _________________________

3. What was the highest temperature? ___________________________

4. At what time did the lowest temperature occur? _______________

*The /\/\/\/\ line across the bottom of the chart indicates that the increments are not calibrated the same.

GRAPHING

Worksheet II

From the line graph below, answer each of the following questions:

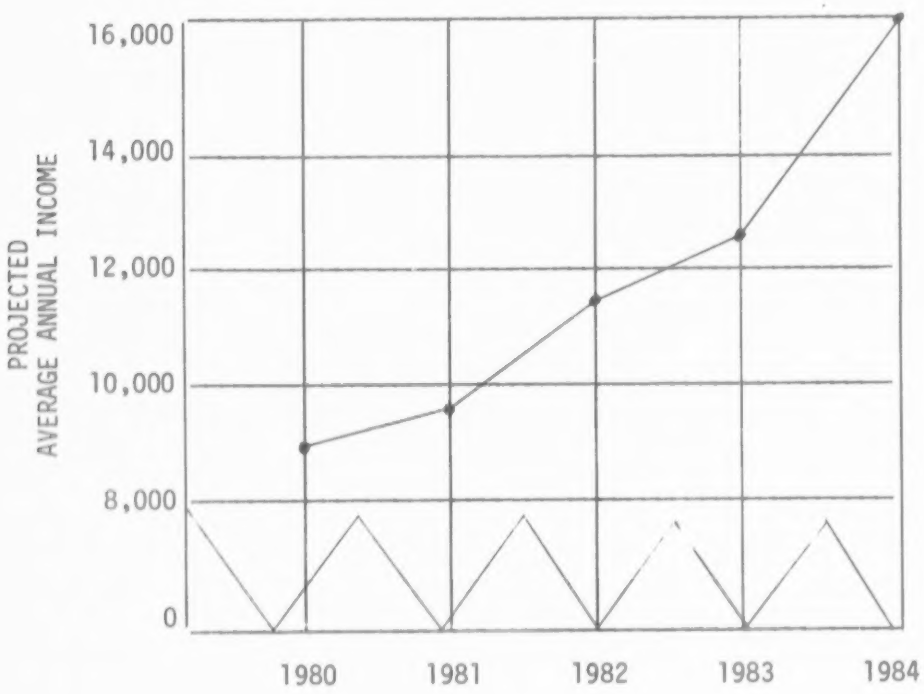
1. What was the average income in 1980? ____________________

2. What year had the largest increase in income? ____________

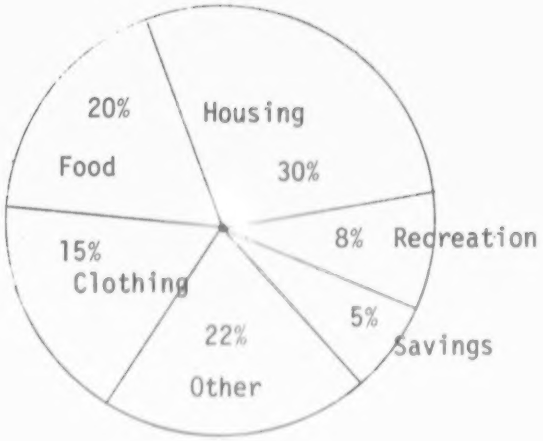
3. How much was that increase? ____________________________

4. What does /\/\/\ in the first level mean? __________

____



Worksheet III



This is a Circle Graph used for budgeting

Tell how the budget dollar is spent:

1. 20% means ________¢ out of each dollar is spent on _______________.
2. 30% means _____¢ out of each dollar is spent on __________________.
3. 8% means ______¢ out of each dollar is spent on __________________.
4. If the total income is $220, compute each of the following:
   - A. Food 20% __________________
   - B. Clothing 15% ______________
   - C. Savings 5% ________________
   - D. Housing 30% _______________
   - E. Recreation 8% _____________
5. If the total income is $180 a week, compute the each of the following:
   - A. Food 25% _________________
   - B. Clothing 15% ____________
   - C. Savings 5% ______________
   - D. Housing 30% _____________
   - E. Recreation 8% ___________

I. PROGRAM TITLE - "Computer Programming"

II. PROGRAM DESCRIPTION
  - A. Students will view a brief tutorial on key words, commands and definitions.
  - B. Students will answer questions dealing with specific commands used in Basic.
  - C. This program is data based.

III. PROGRAM PRINT OUT

IV. REFERENCE MATERIALS
  - A. Peer Tutoring Reference Guide
  - B. Worksheet - Students will complete multiple choice worksheet
  - C. Additional Sources
    1. Perry, Jim and Chris Brown, 80 Microcomputing Peterborough, New Hampshire, 1979.
    2. Dwyer, Thomas A. and Michael S. Kaufman, Computer Programming in Basic for Everyone (Boston: Houghton Mifflin Co., 1973).

V. SKILLS NEEDED

Students must have the ability to use logical deduction.

```
1 '************************************************************
2 '************    COMPUTER PROGRAMMING INTRO    ***************
3 '************          WRITTEN BY              ***************
4 '************        M. MCNEARNEY              ***************
5 '************        M. MCALISTER              ***************
6 '************          J. DALY                 ***************
7 '************   FOR COMP. ASS'T VOC MATH       ***************
8 '************          JUNE 1981               ***************
9 '************************************************************
99 DIMB$(20),B1$(20),C$(20),C1$(20),D$(20),D1$(20)
100 CLS
102 PRINT@203, "TODAY'S TOPIC WILL BE INTRODUCTION TO BASIC."
104 PRINT @328, "THIS IS THE LANGUAGE OF THE TRS-80 MICROCOMPUTER.
"
106 PRINT@460,;:INPUT"PLEASE TYPE IN YOUR NAME";A$
108 GOSUB6000
110 CLS
112 PRINT@128,"BASIC IS AN ABBREVIATION FOR"
114 FOR N=1 TO 10:PRINT@264,"
        ":PRINT@267,"BEGINNER'S ALL-PURPOSE SYMBOLIC INSTRUC
TION CODE":NEXT
116 PRINT@384, "IN THIS LESSON I WILL GIVE YOU A KEY WORD OR COMMA
ND AND IT'S   DEFINITION.  IT WILL BE YOUR RESPONSIBILITY, "A$
118 PRINT@584,  "1.    TO COPY ALL WORDS AND DEFINITIONS DOWN"
120 PRINT@712,  "2.    MEMORIZE THEM FOR A QUIZ LATER."
122 GOSUB 6000
124 CLS
126 PRINT@192, "A PROGRAM IS A SET OF INSTRUCTIONS THAT TELLS THE
COMPUTER WHAT TO DO.  WHEN WRITING A PROGRAM, EVERY LINE MUST BEGI
N WITH A    LINE NUMBER, SUCH AS IN THIS EXAMPLE."
128 PRINT@450,"10      IF A>6 THEN GOSUB 2000"
130 PRINT@708,A$", GET READY TO TAKE DOWN WORDS AND DEFINITIONS"
140 GOSUB6000
150 CLS
155 FOR N=1 TO 20:READ B$(N),B1$(N):NEXT
160 FOR N=1 TO 20:PRINT@155, "DEFINITION #"N:PRINT@321,B$(N):FORX=
1TO10:PRINT@576,"
            ";:PRINT@576,B1$(N):NEXT
170 GOSUB 6000
180 CLS
190 NEXT
195 CLS:PRINT@512, A$", IT'S NOW TIME TO TAKE THE QUIZ.  THERE ARE
 20 PROBLEMS"
196 FORQ=1TO20:READD$(Q):NEXT
197 GOSUB6000
200 CLS:FOR N=1TO20
202         X=RND(20)
204         IF B$(X)="O" GOTO 202
206         C$(N)=B$(X):C1$(N)=B1$(X):B$(X)="O"
208 NEXT
209 FOR N=1TO20
210 PRINT@180, "PROB #"N
```

```
213 PRINT@256, "THIS DEFINITION CORRESPONDS TO (1) - (2) - (3) - (
4) BELOW"
215 PRINT @ 384, C1$(N)
217 X=RND(4)
219 ON X GOSUB 400,500,600,700
220 PRINT @542,"1     "K1$
222 PRINT@606,"2     "K2$
224 PRINT@670,"3     "K3$
226 PRINT@734,"4     "K4$
230 PRINT:INPUT"YOUR SELECTION PLEASE";K$
240 IF K$=KA$ OR K$=KA1$ THEN PRINT@ 862,D$(N):C=C+1:ELSE PRINT@86
2,"SORRY THE CORRECT ANSWER IS, "KA1$
250 GOSUB6000
260 CLS
270 NEXT
275 N=N-1
280 GOSUB 8000
290 CLS:PRINT @512,"BYE"
295 GOTO295
400 K1$=C$(N):KA$=K1$ : KA1$="1"
402 IF N>10 THEN K2$=C$(N-1):K3$=C$(N-2):K4$=C$(N-3):ELSE K2$=C$(N
+1):K3$=C$(N+2):K4$=C$(N+3)
403 RETURN
500 K2$=C$(N):KA$=K2$ : KA1$="2"
502  IF N>10 THEN K1$=C$(N-1):K3$=C$(N-2):K4$=C$(N-3):ELSE K1$=C$(
N+1):K3$=C$(N+2):K4$=C$(N+3)
503 RETURN
600 K3$=C$(N):KA$=K3$:KA1$="3"
602 IF N>10 THEN K1$=C$(N-1):K2$=C$(N-2):K4$=C$(N-3):ELSE K1$=C$(N
+1):K2$=C$(N+2):K4$=C$(N+3)
603 RETURN
700 K4$=C$(N):KA$=K4$:KA1$="4"
702 IF N>10 THEN K1$=C$(N-1):K2$=C$(N-2):K3$=C$(N-3):ELSE K1$=C$(N
+1):K2$=C$(N+2):K3$=C$(N+3)
703 RETURN
999 GOSUB6000
1004 DATA IF...THEN, SENDS THE PROGRAM EXECUTION TO THE GIVEN LINE
 IF THE CONDITION  IS TRUE
1005 DATA FOR, SETS UP AND RUNS THE BODY OF A LOOP A STATED NUMBER
 OF TIMES
1006 DATA NEXT,CLOSES THE LOOP
1007 DATA REM, PERMITS COMMENTS
1008 DATA READ,ASSIGNS VALUES FROM DATA STATEMENTS TO GIVEN VARIAB
LES
1009 DATA GOSUB, SENDS THE PROGRAM TO A SUBROUTINE
6000 PRINT@960,"PRESS C TO CONTINUE"
6001 I$=INKEY$:IF I$="C" THEN RETURN
6002 IFI$="S"GOSUB8000:RETURN
6003 GOTO6001
8000 CLS
8002 PRINT@512, A$", YOU HAVE"C" OUT OF"N" PROBLEMS CORRECT."
8004 PRINT"YOU'RE SCORE IS" INT((C/N)*100)"%"
8006 PRINT:PRINT "ENTER C TO CONTINUE - E TO END"
```

```
8008 INPUT V$
8010 IF V$="C" RETURN
8012 PRINT"GOODBYE, "A$".  MAYBE YOU'LL WORK WITH COMPUTERS SOME D
AY."
8015 GOTO8015
10000 DATA PRINT, TYPES OUT MESSAGES OR VALUES OF NUMERICAL EXPRES
SIONS OR BOTH
10001 DATA LET, CALCULATES AN EXPRESSION AND ASSIGNS THE VALUE TO
A GIVEN        LOCATION
10002 DATA INPUT, REQUESTS DATA FOR CERTAIN VARIABLES FROM THE TER
MINAL
10003 DATA GOTO, SENDS THE PROGRAM EXECUTION TO ANOTHER LINE
10011 DATARETURN, SENDS THE PROGRAM EXECUTION BACK TO THE LINE AFT
ER GOSUB
10012 DATA RND(X), COMPUTER WILL PICK A NUMBER FROM 1 TO X
10013 DATA END, LAST LINE OF A PROGRAM
10014 DATA RUN, BEGINS EXECUTION OF A PROGRAM
10015 DATA LIST, PRINTS OUT THE CURRENT PROGRAM
10016 DATA CLS, CLEARS THE SCREEN
10017 DATA *, SYMBOL FOR MULTIPLICATION
10018 DATA >, SYMBOL FOR GREATER THAN
10019 DATA <, SYMBOL FOR LESS THAN
10020 DATA SET , COMMAND TO LIGHT UP A POINT ON THE SCREEN
10030 DATA SUPER,RIGHT ON, TERRIFIC, YOU'RE NO TURKEY,BOSS,GOOD,SE
NSATIONAL,FANTASTIC,KEEP UP THE GOOD WORK,WAY TO GO
10040 DATA SUPER,RIGHT ON, TERRIFIC, YOU'RE NO TURKEY,BOSS,GOOD,SE
NSATIONAL,FANTASTIC,KEEP UP THE GOOD WORK,WAY TO GO
```

COMPUTER PROGRAMMING

Peer Tutoring Reference Guide

Let's start off with the elementary vocabulary of Basic language. These key words are essential:

"PRINT - Types out message
END - Last line of program
LET - Calculates an expression and assigns the value to a given location
INPUT - Requests data for certain variables for the terminal
GOTO - Sends the program execution to another line
IF . . THEN - Sends the program execution to the given line if the condition is true
STOP - Halts run of program (may be anywhere within the program)
FOR . . (Step) - Sets up and runs the body of a loop a stated number of times
NEXT - Closes the loop"*

In addition to these key words, the following commands are also necessary:

LIST - Prints out the current program
RUN - Begins execution of program
CLOAD - Transfers information from cassette to computer

>	This is a prompt sign. It occurs before you type in a line.
>	This symbol means greater than (4>3)
=	This symbol means equal to
<	This symbol means less than (8<10)
*	This is the symbol used for multiplication

Now, you may be asking yourself what's the difference between a key word and a command. A key word is never used alone; commands are used alone.

*Computer Programming in Basic for Everyone, pg. 156.

Peer Tutoring Reference Guide, Continued

EXAMPLE I

```
                      Ready >

  1st statement:      > 10 PRINT "My name is Sherry" }
                                                     }   Program
  2nd statement:      > 20 END                       }

       Command:       > RUN

                         MY NAME IS SHERRY      --->     Output
```

When we see the word READY (>) , this means that you can begin.

EXAMPLE II

Let's look at the following program and see if we can determine what will happen.

```
       READY >

 > 10  PRINT   "Multiplication of Whole Numbers"

 > 20  PRINT   "7 x 7 is"

 > 30  PRINT    7 * 7

 > 40  END

 > RUN
```

Now the program should run like this:

```
Multiplication of Whole Numbers

7 x 7 is

49
```

You should notice that until you enter RUN, nothing happens

Another point to note is that only what is inside the quotation is printed.

When we typed:

```
30 PRINT  7 * 7
```

49 was the output because no quotation marks were used.

The computer calculated 7 x 7.

40 END   Line 40 tells us that this is the last line of the program and the <u>only</u> command used here was RUN. This means to execute the program.

If we wish to see the program that was written, we would type in LIST (command) and the following would appear:

```
]10  PRINT   "Multiplication of Whole Numbers"

]20  PRINT   "7 x 7 is"

]30  PRINT   7*7

]40  END
```

If we no longer wish to use this program, we could erase it by typing in NEW or by turning off the computer if you are through for the day.

COMPUTER PROGRAMMING

Worksheet - Multiple Choice. Circle the letter of the correct answer.

1. This is the last line of a program.

   (a) PRINT (b) RUN (c) LIST (d) END

2. Types out a message.

   (a) NEW (b) LIST (c) PRINT (d) STOP

3. Requests data for certain variables from the terminal.

   (a) LET (b) INPUT (c) LIST (d) PRINT

4. Means greater than.

   (a) < (b) > (c) = (d) *

5. Means less than.

   (a) < (b) > (c) = (d) *

6. Sends the program execution to another line.

   (a) FOR (b) GOTO (c) LET (d) END

7. Prints out the current program.

   (a) END (b) PRINT (C) RUN (d) LIST

8. Begins execution of program.

   (a) PRINT (b) RUN (c) LIST (d) NEW

9. Which is not a command?

   (a) RUN (b) LIST (c) PRINT (d) CLOAD

10. Sends the program execution to the given line if the condition is true.

    (a) INPUT (b) STOP (c) LET (d) IF THE

APPENDIX

TROUBLE SHOOTING MANUAL

FOR

COMPUTER ASSISTED VOCATIONAL MATH

WRITTEN FOR
TRS-80, MODEL I, LEVEL II, 16K

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FORWARD

The Trouble Shooting Manual was designed to be used in conjunction with the Computer Assisted Vocational Mathematics programs. It was developed to assist educators in implementing all or part of the curriculum.

Although it was written primarily for vocational mathematics students, its mathematical bounds are limitless as it addresses the need to develop a realistic curriculum compatible with the job market of the 80's.

The curriculum developers included the original program printouts since a typed copy, missing only one punctuation mark, would cause the program to crash. As long as they are sequential, line numbers can be changed, with no effect on the program. The exception would be line numbers which are the result of a goto or subroutine statement.

GENERAL FEATURES

COMMON ERROR MESSAGES

As you execute a program, you may encounter little error messages along the way. This section will try to explain the most frequently encountered types of errors and how to rectify them. If others do appear, please refer to your microcomputer's manual for instructions.

Errors may occur if garbage is picked up. Garbage will appear as gibberish lines, making no sense at all. If the garbage is very extensive, look up the printout of the program affected and retype in lines containing the damage.

Also, garbage sometimes can be eliminated by loading the program in again at a different volume setting.

In order to try to eliminate garbage, try to store tapes in a place where they cannot become demagnetized (metal cabinets, etc.) or do not use electrical appliances such as vacuum cleaners near them. You should clean cassette players frequently with head cleaner.

Error messages commonly seen are:

SN - syntax error - usually comes from a punctuation error, illegal command or spelling error. To correct, put line in edit mode and look for any of the above for correction (see Editing).

OD - out of data - items in data line number less than the computer expected. This may have occurred when instructor changed data lines to suit needs of class. Be careful to replace pieces of data on a one for one basis.

UL - undefined line - computer was sent to an undefined line to correct nonexistent line.

OM - out of memory - not enough memory left in microcomputer to hold program. To correct, make sure you have a Level II of at least 16K memory. Also, sometimes residual program is left in memory, so NEW can be entered before reloading program.

EDITING

A unique feature of the TRS-80, Level II is its ability to edit. As garbage is picked up by the tapes, changes in data or random generators must be made or errors to be corrected keep appearing. This function is invaluable to the instructor.

To see all of your program type LIST and press /Enter/. The entire program will scroll up the screen. However to see any portion of the program, type LIST line # - line # and press /Enter/. For example, LIST 300 - 320 will cause the lines 300 through 320 inclusive to appear on the screen.

In order to edit, you must first get into edit mode. To do this, type in EDIT followed by the line number of the lines needing changes. For example,

```
EDIT 200
```

Press /Enter/ and the line number will appear beneath the command with the cursor directly after it such as,

```
200 _
```

You are now ready to edit.

If you press the /Space Bar/, one character at a time will appear on the screen until you reach the section of the line that needs editing. For a total line to appear first (so you may take a good look at it and still remain in edit mode), press /L/ and /Enter/.

Now let's go into specific editing features.

1. To change a character, press /C/ at the point needing change then type in the corrected character. If other changes are needed of

some line, press the /Space Bar/ to get there, then repeat the process. When changes are complete, press /Enter/.

2. To delete a character is similar to changing, except when you reach the character to be deleted, press /D/. Each time /D/ is pressed, another character is erased from line. Press /Enter/ when corrections are complete.

Both features, changing and deleting, can be done for more than one character by typing in number of characters to be edited first then either /C/ or /D/ such as,

Type 3 C - enables you to change 3 characters

Type 5 D - automatically erases 5 characters

3. If you wish to extend a line previously entered, press /X/ and the line will appear ready to be added to.

4. Inserting additional characters in a line is done by typing in /I/. You now can insert as many characters as needed in that part of line as you wish. To get out of insert mode, press either /Enter/ to end or left /Shift/ then /↑/ (up arrow). This allows you to move to another section of same line to continue editing before pressing /Enter/.

DATA VS RANDOM GENERATION

In each of the programs, the problems can be produced either by data lines of by random generators. In each case, they have the ability to be changed to better meet the needs of the instructor.

Data lines will give the program less flexibility as it never changes the content of the tests. For instance,

```
1000 DATA  4 + 6,  3 + 9,  2 + 5
```

will always remain the same so that test questions will be mixed according to order of appearance but still be the three problems above.

Random generated problems are certainly preferable as they automatically change the problems each time the test is run. The chances of having the same problem appear twice is very slim. They might appear in the program as

```
111 A = RND (9):  B - RND (9)
112 PRINT A "+" B
```

When executed, a different digit (from 1 to 9 inclusive) will appear each time for A and B.

For class levels, changes might be warrented to alter the problems. Changing DATA lines consists of:

1. having the same amount of data pieces as originally stated in line.

2. exchanging those pieces of data on a one-to-one basis in data lines (remember the commas). For example,

`1000 DATA  4 + 6,  3 + 9,  2 + 5` can be replaced by

```
1000 DATA  42 + 36,  95 + 25,  100 + 25
```

It is important to note that if problems are changed and answers are also contained in data lines, the answer line must be changed accordingly.

To change random generators, merely find the line that contains the parts of the problem you wish to change. Then by edit mode, you change the number within the ( ) to whatever limit you wish such as,

A = RND (9) can be changed to

A = RND (999)

This will allow for up to three digit numbers to appear when A is needed.

Look on individual program explanations in this manual for location of either DATA lines or Random generators

WHAT IS A MENU?

The menu portion incorporated in each of the programs is the unique feature of the Computer Assisted Vocational Mathematics curriculum that allows the student to practice their skills in the vocational field of their choice.

After finishing the general tests, a menu appears as follows:

1. AUTOMOTIVE
2. BEAUTY CULTURE
3. CLIMATE CONTROL
4. ELECTRICAL
5. MED DENT TECH
6. REC VEHICLES
7. BUILDING TRADES

By entering the number of the field of your choice, the program automatically branches off to three problems of application in that specific area. Once the student completes the three problems, the test is scored by the computer and presented to the instructor on the screen for the recording of grades.

STOP FEATURE

This is a programming technique designed to allow the instructor to break into a student's test and see the progress at any given point. It will tell the number of problems correct out of the number attempted and the scored earned thus far.

How to use this stop feature:

1. When "PRESS C TO CONTINUE" appears, press /S/ instead.
2. On the screen will appear:

"(STUDENT'S NAME) SCORED 4 OUT OF 5 TRIED
FOR A SCORE OF 80%"

3. Following this appearing will be:

"PRESS C TO CONTINUE"
"PRESS M TO GO TO MENU"
"PRESS E TO END"

4. Choose one of the above. If /C/, then you will return where you left off. If /M/, you will skip the rest of the quiz and go directly to the vocational section. If /E/, you will end program with the score as is.

OVERVIEW OF INDIVIDUAL PACKETS

OVERVIEW OF INDIVIDUAL PACKETS

This section of the trouble shooter's manual is designed to enable the user immediate program information on each of the 32 packets.

Special features of each program are discussed along with implementation instructions when applicable.

	NAME OF TAPE	MENU	RAN/DATA	STOP
1	Diagnostic	No	R&D	Yes
2	Add Decimals	Yes	RND	Yes
3	Sub Decimals	Yes	RND	Yes
4	Mult Decimals	Yes	RND	Yes
5	Div Decimals	Yes	RND	Yes
6	Rounding	Yes	RND	Yes
7	Ruler I- Equiv Frac	No	DATA	No
8	Concentration	No	DATA	No
9	Ruler II- Imp. Frac. Mult/Div	No	DATA	No
10	Concentration	No	DATA	No
11	Percents	Yes	RND	No
12	Payroll	Yes	RND	No
13	Meter	Yes	DATA	No
14	Meter Concen.	No	DATA	N/A
15	Liter	Yes	DATA	No
16	Liter Concen.	No	DATA	No
17	Gram	Yes	DATA	No
18	Gram Concen.	No	DATA	N/A
19	Perimeter	Yes	RND	Yes
20	Concentration	No	DATA	Yes
21	Area	Yes	RND	Yes
22	Lateral Area	Yes	RND	Yes
23	Tic Tac Toe	No	DATA	No
24	Volume I	Yes	RND	No

NAME OF TAPE	MENU	RAN/DATA	STOP
25 Volume II	Yes	RND	No
26 Simplifying Expressions	Yes	RND	No
27 Solving Equa.	Yes	DATA	No
28 Solving Equa. with Formulas	Yes	DATA	No
29 Shop Formulas	Yes	DATA	No
30 Ratio/Prop.	Yes	DATA	Yes
31 Reading Graphs	No	DATA	No
32 Programming	No	DATA	Yes

1 DIAGNOSTIC TEST

DESCRIPTION OF PROGRAM

The program provides 24 general diagnostic questions. They cover addition, subtraction, multiplication and division of whole numbers; operations with fractions; operations with decimals, percents; selection of an operation; and word problems.

SPECIAL FEATURES

Except for the first three problems which are randomly selected, the program is data based. In addition, the data cannot easily be changed.

This program contains the Stop function; that is, as a student is taking the test, the teacher may press /S/ when "PRESS C TO CONTINUE" appears on the screen. The computer will then ask if you want a hard copy. To answer yes, the computer must be attached to a printer. The computer will then print out the student's progress to that point and list the problems for which incorrect responses were given. If the computer is not connected to a printer, type /N/ or NO when the computer asks if you want a hard copy. If YES is typed, the program will crash!

At the end of the program, the computer will ask if you want a hard copy. If attached to a printer, type /Y/ or YES and the computer will print out the score as well as the problems receiving incorrect responses. If not connected to a printer, the computer will print the information on the screen. This provides the teacher with valuable information to individualize the student's program.

2 ADDITION OF DECIMALS

PROGRAM DESCRIPTION

This program gives a review of simple rules for adding decimal numerals. Special emphasis is placed on the location of a decimal point in a whole number and placing zeros in addends to aid in lining up digits.

SPECIAL FEATURES

The student will encounter a practice session of three problems that can be repeated an infinite amount of times if necessary. The problems are randomly generated so the problems are new for each session. (Random generators are at LINE 268) Once mastery is achieved, a test of twenty probelms, randomly generated, will be presented to the viewer. Both practice session and test have Stop feature for better monitoring of student's progress by the instructor.

The vocational section has three problems involving addition of decimals in areas of weight, time and money.

To change the difficulty level of all problems, the random generators located at LINE 320 and LINE 6999 can be adjusted.

For example,

RDN (99) to RND (999) by using the edit mode.

To change the responses, change the data line located at 8000. Remember to replace them on a one to one basis. To change the items in the vocational section, change the data in LINE 9000 - 9010.

These problems are often seen on Minimum Basis Skills tests.

3 SUBTRACTION OF DECIMALS

The student will be able to view the basic rules dealing with setting up a problem, lining up decimal points and performing three sample problems. The practice session has randomly generated problems with the option to repeat if needed. If the degree of difficulty needs to be changed, change random generators in LINE 380.

The quiz has 20 problems randomly generated (change can be made in LINE 1020 for varying degrees of difficulty). The Stop feature can be used at any point to monitor student's progress. When completed, computer scores the test, then begins the vocational quiz of three problems. The data lines involved with vocational items can be found at LINE 8100, LINE 8200 and LINE 8300 for editing.

Responses can be altered in data LINE 8000 while random generators can be found at LINE 9000, LINE 9050 and LINE 9115.

These problems are often seen on Minimum Basic Skills tests.

4 MULTIPLICATION OF DECIMALS

PROGRAM DESCRIPTION

This program briefly goes over basic rules of multiplying decimals after informing the student of important needs required to do well in this skill. An example is slowly flashed on the screen to show the process to be adhered to during examination of skills. In a second problem, an opportunity to do a sample by the student is provided and instant correction available.

A practice set of four problems is randomly generated and can be repeated as many times as user wishes or entirely omitted to go directly to the quiz. Random generators are located at LINE 600.

The quiz is comprised of ten problems involving whole numbers and decimals. They are random so that the test will be unique each time the program is executed. All random generators are located at LINE 755, but be careful in changes as the scoring may be affected because of decimal values. Automatic Scoring is done at completion of test. The program does contain the Stop feature for instant monitoring of student's progress.

Upon recording of the quiz grade, the menu problems are presented in the context of a bill. A graphic of a bill appears with item, number of items, and unit cost. The problem is to compute three total costs using this information. The items on the bill are taken from the vocational field of the student's choosing. The number of items and prices are randomly generated on LINE 4123, LINE 4130 and LINE 4140. If the items need to be changed, sutstitutions can be made on LINE 8007, LINE 8008, and LINE 8009.

These problems are often found on Minimum Basic Skills tests.

5 DIVISION OF DECIMALS

Division of decimals is approached from two angles: one, dividing a decimal by a whole number; two, dividing a decimal by a decimal. If the student chooses to skip the tutorial due to expertise in this skill, the ability to do so is available, and the practice problems will appear.

The tutorial reviews need to know estimating and multiplication by powers of 10. This is followed by rules for Type 1 problem -- dividing decimals with wholes and an example that goes at student's speed. At this point, the idea of rounding off to a given place value is stressed in order to end non-terminating decimals. Next Type 2 -- dividing with a decimal -- is presented. Here, the multiplication of decimals by 10's is used to change the divisor to a whole and the dividend is multiplied to keep the problem equivalent. An example is presented to the student where visually the decimal point moves to create an equivalent problem with a whole number divisor. Once again, practice problems (four) are presented to the student to allow for the perfecting of the skills before test time. All answers are to be rounded to hundredths place. All problems are randomly generated and can be changed to meet needs of the teacher by changing numbers in praentheses on LINE 552 and LINE 563. Option to keep practicing is available to the student.

The quiz appears with ten randomly generated problems (LINE 645 and LINE 680). The Stop feature has been included in this program to facilitate the monitoring of student's progress. Scoring is done by the computer at the test's conclusion.

Next, the vocational quiz will allow the students an opportunity to choose the field of their choice where items are given in quantities with total cost and the finding of the unit price is the problem to be solved. The scoring is based on three problems and the data lines that control the types of items are located at 8005, 8006 and 8007. All numbers are randomly generated on LINE 4120, LINE 4170 and LINE 4230. By changing the numbers in the parentheses, you can raise or lower the numbers appearing.

6 ROUNDING NUMBERS

PROGRAM DESCRIPTION

This program reviews the rules for rounding numbers first through whole numbers and later with decimals. A place value chart is used to help locate the numbers to be rounded. The chart is used in the peer tutoring manual and also throughout the program itself.

SPECIAL FEATURES

This program has several special features. First, all problems are randomly generated. Changes can be made to increase the level of difficulty by altering LINE 150, LINE 400 and LINE 600. To increase the level of difficulty in the application problem area, change LINE 4100 through LINE 4310 inclusively.

This type of problem is often seen on the Minimum Basic Skills tests.

7 RULER I - EQUIVALENT FRACTIONS

By using the rules, the lesson of equivalent fractions is easily presented to the students. They can see how one segment of a ruler can have various names but all be the same in measure. This tutorial goes on to explain the details of finding new numerators of given fractions when raised to higher or reduced to lower denominators.

At this time, twenty problems are done where equivalent fractions must result as a result of the student's input.

Once the mini quiz is completed, the tutorial is resumed and addition of fractions is covered. Unlike fractions are used; therefore, equivalent names for them are needed. Examples of addition problems are studied by the students before entering quiz.

The quiz consists of twenty problems which appear in random order but the problems remain the same due to data lines providing them. In order to change these, one must go to LINE 25, LINE 26 and LINE 27 for substitution of data. The answers must be typed in three parts: one, whole numbers (0 if necessary); two, numerator; and, three, denominator. The scoring is done automatically by computer.

No menu appears in this program due to the greater number of problems.

These problems appear in many standardized tests such as the Minimum Basic Skills.

8 FRACTION CONCENTRATION

DESCRIPTION OF PROGRAM

In order to supplement the lesson of Ruler I, Equivalent Fractions, this computer game is a very effective way of drilling the students in the skills mentioned.

By using the game of Concentration, the student must perform the skill of finding the equivalent fraction that matches the given one on the screen. Or, if data is changed, the student must compute the sum of fractional problems in order to see the sum and search for it on the gameboard.

SPECIAL FEATURES

Four spearate groups of data have been supplied in the program--two on equivalent fractions and two on addition of fractions. They are located in LINE 1000 through LINE 1004, but be careful to replace items in the same position as before with the proper punctuation.

One or two players can play and automatic scoring is done by the computer until 15 chances are used up.

9 RULER II, IMPROPER FRACTIONS, MIXED NUMBERS, MULTIPLICATION AND DIVISION OF FRACTIONS

By using the ruler, once again the importance of renaming fractions mixed numbers and improper fractions can be illustrated. The student will first see a mixed number being changed to an improper fraction followed by a series of rules to follow when computing the missing numerators in the next ten problems. All problems are data based and can be changed to new problems by altering LINE 20.

The next tutorial allows the student to view the reverse of the first section, changing improper fractions to mixed numbers. Simple instructions are outlined for the students to follow and an example is given. If the student wishes to see the example again, it can be done. The quiz following is data based. The items to be replaced (if necessary) can be found on LINE 21. There are ten problems with immediate scoring. The student is returned to two tutorials on multiplication and division of fractions where examples for the students to follow are given. Both are followed by individual quizzes of ten problems each. The quizzes are supplied with problems from data LINE 22, LINE 23, LINE 24, and LINE 25.

These problems are very often seen on standardized tests such as the Minimum Basic Skills test, the California Achievement Test and others.

10 RULER II - CONCENTRATION

(MIXED NUMBERS, IMPROPER FRACTIONS, MULTIPLICATION AND DIVISION OF FRACTIONS)

DESCRIPTION OF PROGRAM

This program has students with a background in fractions to:

1. match improper fractions with their proper mixed number equivalents
2. multiply fractions with their correct responses

The packet includes three worksheets. In order to successfully complete this concentration, students need a working knowledge of mixed numbers, improper fractions and multiplication and division of fractions.

SPECIAL FEATURES

All concentrations are data based and therefore can be replaced by substituting the data lines indicated. In this program, they are LINES 1000 through 1004.

11 INTRODUCTION TO PERCENTS

PROGRAM DESCRIPTION

The program provides a tutorial on writing percents as decimals and finding percentages of a number. There are twenty problems where the student must rewrite a percent as a decimal. This is followed by twenty problems where a student must find the percent of money. The vocational problems present the student with a graphic display of a bill and they are asked to find a discount.

SPECIAL FEATURES

This program is completely random based. Therefore, it can be used for review or to re-test a student who might have been absent. The program also contains the Stop function which allows the teacher to press /S/ when PRESS C TO CONTINUE is displayed on the screen. At this point, the computer will print out the student's progress to date.

The program also contains a menu which provides excellent vocational problems.

12 PAYROLL

PROGRAM DESCRIPTION

Students are guided through a payroll lesson in terms of gross pay, net pay and deductions. They are appraised of payroll being an integral part of any and all vocational areas. Straight time versus overtime is focused upon. Percentages are looked upon in terms of deductions. Worksheets along with application sheets are included in the packet.

SPECIAL FEATURES

This program includes a menu; that is, application problems that deal with specific vocational areas in the seven primary vocational topics covered -- Automotive, Beauty Culture, Climate Control, Electrical, Med/Dent Technician, Recreational Vehicles, and Building Trades. This program is data based. The payroll program is supplied with the Stop function that is activated by pressing the /S/.

13 METRIC MEASURE - LENGTH

Students are introduced to the metric system through practical application problems. The main thrust of this program is metric relevance. Approximations are used rather than conversion formulas so that the student can view the basic elements of the metric system in terms of length. Several skills are needed in order to complete the metric program series.

SPECIAL FEATURES

Since the metric system covers all facets of measurement, each metric lesson includes a metric concentration. This program is data based, and the application problems can be changed at LINES 10,000 and 10,004.

14 METER CONCENTRATION

Students are faced with four types of concentration:

1. matching metric units
2. matching metric equivalents (level 1)
3. matching metric equivalents (more difficult)
4. matching metric prefixes and key words

This packet is meant to be used only if the student has a basic understanding of the meter.

SPECIAL FEATURES

By adding any other eight pairs of metric equivalents, another meter concentration could be formed. This change would occur in LINE 1000 through LINE 1004.

15 METRIC MEASURE - VOLUME

Students are introduced to the liter, the basic unit of capacity, through practical applications. The root word along with the prefixes are explained. Changing to a larger or smaller unit is developed through a place-value chart. Application problems in the vocational areas are supplied.

SPECIAL FEATURES

Although this program is primarily data based, changing the lines that deal with data (LINE 1005, LINE 1500, LINE 1800), new problems could be generated.

The application problems are also data and therefore, the same applies.

These types of problems are often seen on standardized tests such as the Minimum Basic Skills test.

16 LITER CONCENTRATION

This program was designed as a supplement to the Metric Measure - Volume program. It has two concentration games. A base understanding of metric measure is needed in order to successfully complete this packet.

SPECIAL FEATURES

By adding any other eight pairs of metric equivalents, another Volume Concentration could be added. This change could take place in LINE 1000 through LINE 1004 inclusive.

408

17 METRIC MEASURE - MASS OR WEIGHT

PROGRAM DESCRIPTION

Students are introduced to metric measure through practical examples. Sample problems using kilogram, gram and milligram are given.

SPECIAL FEATURES

Several worksheets are alotted along with application problems. Students can see movement within the metric system. This type of problem is often seen on such standardized tests as the Minimum Basic Skills test.

18 GRAM CONCENTRATION

PROGRAM DESCRIPTION

This program was designed as a supplement to the Metric Measure - Mass or Weight program. Basically, it has four facets: matching metric units, matching metric equivalents (level 1), matching metric equivalents using more difficult measures, and matching metric prefixes and root words.

SPECIAL FEATURES

By adding any other eight pairs of metric equivalents, another metric concentration could be created.

19 PERIMETER

PROGRAM DESCRIPTION

This program begins by defining perimeter. It looks at several figures including square, rectangles, triangles, hexagons, circles, and pentagons as well as many irregular geometric figures.

SPECIAL FEATURES

A menu with practical application problems that are randomly generated is included. Along with this, all general area perimeter problems are randomly generated.

This program has the special Stop feature activated by the /S/ key.

These problems are often seen on standardized tests such as the Minimum Basic Skills test.

20 POLYGON CONCENTRATION

PROGRAM DESCRIPTION

This game may be played with one or two players. It reviews the names of the polygons in the first program and various formulas in the second.

SPECIAL FEATURES

The program is completely data based. LINE 1000 contains the name of the topic. LINE 1001 and LINE 1002 contain the information, and LINE 1003 and LINE 1004 contain the matching answers.

In this program, it is very important that the double commas be used after each piece of data except the last one.

21 AREA

PROGRAM DESCRIPTION

This program provides an excellent tutorial on area. Graphics are used very effectively. Areas of rectangles, squares, triangles, circles and trapezoids are covered.

The quiz consists of twelve problems where the students must determine the area. This is followed by a menu selection.

SPECIAL FEATURES

The program is completely random based; therefore, it can be used for making up tests, etc. It may also be used for extensive review.

It also contains the Stop function which means that while a student is taking a test, the teacher may press /S/ when PRESS C TO CONTINUE appears on the screen. This will enable the teacher to see the student's progress to that point.

The data lines are LINE 10000, LINE 10001, and LINE 10002. They contain information for the menu and may be changed by retyping the lines.

22 LATERAL AREA & TOTAL SURFACE AREA

The tutorial covers lateral area and total surface area. The quiz consists of five problems where the students must find the lateral area of a cylinder. It is then followed by five total surface areas, followed by three menu problems.

SPECIAL FEATURES

The program is random based; therefore, the problems will be different each time it is run.

The program also contains the Stop feature. That is, whenever a student is doing a guiz, the teacher may press /S/ when PRESS C TO CONTINUE appears on the screen. The student's progress to that point will be displayed.

The program contains a menu.

23 TIC TAC TOE

PROGRAM DESCRIPTION

This is the popular game; however, a student must correctly answer a question before he/she can select a box for the "X" or "O".

SPECIAL FEATURES

This program is completely data based. Because of this, it can be used in many ways. It could easily be adapted for many sections.

The data is all contained in LINE 7000. Nine equations, each followed by the correct answer, are listed. If necessary, more data lines could be used; for example, 7005, 7006, etc.

The questions are randomly selected so the first equation in the data line will not necessarily be first.

415

24 VOLUME

PROGRAM DESCRIPTION

The tutorial covers the volume of a rectangular solid and the cylinder.

There are twenty problems where the student must find the volume. This is followed by ten cylinder problems.

SPECIAL FEATURES

All of the problems are randomly generated. Therefore, every time the program is run, it will contain a different set of problems.

The data lines for the menu are 6005, 6010 and 6020. By changing these lines, the rectangular or cylindrical items will change in the menu.

Each data line contains seven items each corresponding to a selection on the menu. The order is as follows: Automotive, Beauty Culture, Climate Control, Electrical, Med/Dent Tech, Rec Vehicles and Building Trades.

25 VOLUME OF PYRAMID, CONE AND SPHERE

PROGRAM DESCRIPTION

The tutorial provides a comprehensive review of the pyramid, cone and sphere. The graphics are excellent. The quiz is unique in that it follows each tutorial section.

SPECIAL FEATURES

The program contains a menu. Each section is randomly generated including the menu questions.

26 SIMPLIFYING EXPRESSIONS, USE OF EXPONENTS AND EVALUATING EXPRESSIONS

PROGRAM DESCRIPTION

The tutorial covers simplifying expressions. Several examples are given.

The first part of the quiz consists of ten two-part questions. First, the student must simplify an expression. Second, the student must evaluate the expression for a given value. The next part of the quiz consists of five two-part problems. In part 1, the student must square a number; part 2, the student must cube a number.

The next section contains ten problems where the student must simplify expressions by following the order for simplification.

Finally, three vocational problems follow.

This program provides excellent review for simplifying expressions, raising to powers, and order of operations.

SPECIAL FEATURES

The program contains a menu. The first ten questions are randomly generated. Therefore, every time the program is run, a different set of problems results. The next five problems (raising to a power) are also randomly generated.

The next ten problems are data problems. The data is contained in LINE 395, LINE 396 and LINE 397. These may be changed by retyping the lines. The expression first followed by a comma followed by the answer. More than one expression can be included in a line provided each piece of information must be followed by a comma.

The vocational problems are randomly generated.

27 EQUATIONS

PROGRAM DESCRIPTION

The program provides a tutorial on solving simple equations. The procedure is comprehensively explained. The student will be asked to solve twenty simple equations. It is then followed by three vocational problems which deal with specific areas.

The program is excellent for review.

SPECIAL FEATURES

This program contains a menu completely data based; however, the data is selected randomly. LINES 440, 445, 450, 460, 470, 480, 490, 500, 510, and 520 contain the data for the equations. To change a data line, type in the new equation followed by a comma, followed by the answer. Several equations may be contained in each data line; however, each must be followed by a comma and the answer.

28 SOLVING EQUATIONS WITH FORMULAS

PROGRAM DESCRIPTION

This program contains a tutorial which explains how to solve equations containing one variable by using addition, subtraction, multiplication and division.

The menu section contains excellent problems dealing with realistic vocational problems. It would be a good program to use for review as well as a tutorial for Algebra I.

SPECIAL FEATURES

The program contains a menu which is all data based; however, the position is randomly selected. LINES 440, 445, 450, 460, 470, 480, 490, and 500 contain the data lines.

To change the equations, the equation must be typed followed by a comma, followed by the answer.

29 SHOP FORMULAS

PROGRAM DESCRIPTION

The tutorial covers techniques involved in solving formulas for practical use. It explains how to solve for any variable when many are involved. For example, in the formula, $V = GT$, the student is taught how to solve for G, V, or T.

The quiz consists of ten two-part problems. The student is given a three variable formula and is asked to solve for each variable given the other two.

SPECIAL FEATURES

The program contains a menu. The formulas may be changed by retyping data lines 1000, 1010, 1020, 1030, 1040, 1050, 1060, 1070, 1080, and 1090.

For example, suppose the formula $A = BH$ were to be used instead of $A = \frac{1}{2}BH$. Retype LINE 1000 first, type the formula, followed by a comma and the variable to be solved for, comma, the value of the other two variables each separated by a comma, a second problem asking for another variable followed by a comma, the value of the other two variables each followed by a comma, and finally the answer to each part, each followed by a comma.

EXAMPLE

$A = BH$ solve for A if $B = 10$ and $H = 4$

solve for B if $A = 50$ and $H = 5$

The answer to part 1 is 40 and to part is 10

To use this problem LINE 1000 would become

```
1000 DATA "A = BH", A, B=10, H=4, B, A=50, H=5, 40, 10
```

30 RATIO AND PROPORTION

PROGRAM DESCRIPTION

The ability to work with ratios and proportions is essential in all vocational areas. This program provides an excellent tutorial using actual ratios and proportions used in industry. The quiz has ten questions where the student must express a ratio in simplest form. The next ten questions concern finding a proportion by finding the pitch of a roof, by using the rise/run. The next ten questions deal with solving proportions.

SPECIAL FEATURES

This program has a menu. In addition it has the Stop feature. Whenever a student completes a problem, the teacher, instead of pressing C to continue, presses S. The computer will display the student's score to this point.

This program is completely data based. LINES 10000, 10001 and 10002 contain the data for the first ten questions. By retyping these lines, the ratios can be changed. Suppose a replacement for 18 to 24 by 50 to 100 was to be made. Retype LINE 10000 to read 10000 DATA 50 TO 100, 1, 2 etc. Notice the numerator and denominator of the answer must follow separated by commas.

LINES 10003, 10004, 10005, and 10006 contain the data for the other questions.

LINES 10010, 10020, and 10030 contain information for the menu questions. These may also be changed by retyping the lines.

31 GRAPHING

PROGRAM DESCRIPTION

This program is used to introduce students to various types of graphs. The tutorial explains line graphs, circle graphs, and bar graphs. The quiz covers bar graphs and locating coordinates. After lesson 32, students should be able to plot points and create their own graphics.

SPECIAL FEATURES

The program is completely data based. It is not easily modified because the graphics are difficult to display. In addition, students may differ over their estimations of answers. Its best use would probably be as a review after graphing has been introduced.

32 COMPUTER PROGRAMMING

PROGRAM DESCRIPTION

This program is designed to introduce students to basic. With the knowledge learned in this section, they will be able to write simple programs on their own. Examples may be found in the reference materials.

SPECIAL FEATURES

This program is completely data based; however, the data is randomly selected when the program is run. That is, problem #1 will probably be different every time the program is run. In addition, the position of the answer is randomly selected. It may occur in position 1, 2, 3, or 4 at any time.

This program could be used for any twenty definition test by changing data lines. LINES 1004, 1005, 1006, 1007, 1008, 1009, 10000, 10001, 10002, 10003, 10011, 10012, 10013, 10014, 10015, 10016, 10017, 10018, 10019, 10020 each contain one term and definition. Suppose you wanted to delete the term CLS and add INT(X). By retyping LINE 10016, this can be quickly accomplished. By using the command LIST instead of RUN, the prompt sign (ready >) will appear. Merely type 10016 DATA INT(X), GREATEST INTEGER FUNCTION. The computer will now replace the old line 10016 with this new line.

LINES 10030, 10040 can be used to change responses when the student gives a correct answer.

SAMPLE PACKET BREAKDOWN

In order to facilitate the utilization of a curriculum such as Computer Assisted Vocational Mathematics, the following is a sample packet along with an explanation.

I. PROGRAM TITLE - "Ruler II - Improper Fractions, Mixed Numbers, Multiplication & Division of Fractions"

Each packet commences with its specific title and components.

The second facet of each packet is the program description. Several aspects of the program are covered here in sequential order.

II. PROGRAM DESCRIPTION
   A. Student will view a tutorial section that will show them how to change mixed numbers to improper fractions.
   B. Students will complete problems where they will change mixed numbers to improper fractions.
   C. Students will view a tutorial section on changing improper fractions to mixed numbers.
   D. Students will complete problems where they change improper fractions to mixed numbers.
   E. Students will view a tutorial section that explains multiplication of fractions.
   F. Students will complete multiplication of fractions problems.
   G. Students will view a tutorial section that explains division of fractions.
   H. Students will complete division of fractions problems.

The first thing mentioned under A is a tutorial section. This explains what is to be reviewed. The of the program description coincides with the order of the program itself.

The problems mentioned under B are data based but their positions are randomly generated to help insure independent effort on the student's part.

Often, in a program, more than one topic is covered. This is typical of such a program. Section C notes that a tutorial section is listed on changing improper fractions to mixed numbers and so the process continues until all of the topics of the program title are mentioned.

III. PROGRAM PRINT OUT

The main purpose for a print out of the program is three-fold:

1. This print out allows you to type the program verbatum if you do not have the program tapes.

2. With the print out, you can retype any lines that may be lost.

3. The print out enables you to locate parts of the program at a glance.

IV. REFERENCE MATERIALS

- A. Peer Tutoring Reference Guide
- B. Worksheets (four covering each topic: mixed numbers to improper fractions, improper fractions to mixed numbers, multiplication of fractions, division of fractions).
- C. Application Problems
- D. Additional Sources
  - 1. Edwin I. Stein, Refresher Mathematics (Boston: Allyn and Bacon, 1980), pp. 100-111.
  - 2. Keedy et al., General Mathematics (Menlo Park, California: Addison Wesley, 1980), pp. 170-188.

Peer Tutoring Reference Guide - The guide was written in conjunction with the tutoring section of the program.

EXAMPLE I

Express as an Improper Fraction

$3\frac{1}{4} = \underline{\quad ? \quad}$

$$3 = \frac{12}{4} + \frac{1}{4} = \frac{13}{4}$$

The simplest way to do these problems is to:

1. multiply the whole number by the denominator
2. add the numerator to this product
3. this is the new numerator
4. keep the old denominator

Each type of problem is reviewed in this manner.

EXAMPLE II

Changing improper fractions to mixed numbers

$$\frac{18}{5} = \underline{\quad ? \quad}$$

EXAMPLE III

Multiplication of Mixed Numbers

$$5\frac{3}{4} \times 2\frac{2}{3} = \underline{\quad ? \quad}$$

EXAMPLE IV

Division of Fractions

$$1\frac{1}{2} \div 2\frac{1}{6}$$

And a step-by-step outline of each example is always included as shown below.

EXAMPLE IV

Division of Fractions

$$1\frac{1}{2} \div 2\frac{1}{6}$$

1. change the mixed numbers to improper fractions

$$\frac{3}{2} \div \frac{13}{6}$$

2. change division to multiplication by inverting the divisor

$$\frac{3}{2} \times \frac{6}{13}$$

3. multiply

$$\frac{3}{\cancel{2}} \times \frac{\cancel{6}^{3}}{13}$$

4. ANSWER is:

$$\frac{9}{13}$$

This is a step-by-step outline of how to express a mixed number as an improper fraction. The guide itself may be used in many ways. Below are just a few suggestions:

1. If a student misses a lecture, the teacher can turn to the Reference Guide and either have the student work on it alone or with the aid of another class member.

2. If the teacher finds that more review is necessary, the Peer Tutoring Reference Guide may be used.

3. This reference guide works well in conjunction with lesson plans and/or chalkboard examples.

Worksheets - there are four covering each topic: mixed numbers to improper fractions, improper fractions to mixed numbers, multiplication of fractions, division of fractions.

Worksheet I - Changing Mixed Numbers to Improper Fractions

Worksheet II - Changing Improper Fractions to Mixed Numbers

Worksheet III - Multiplication of Fractions

Worksheet IV - Division of Fractions

The following worksheets may be used for all students in initial instruction or for students who need additional assistance. They can be duplicated through the Thermofax masters and used several times. Each topic covered in the Peer Tutoring Reference Guide is also covered via a worksheet.

Worksheet I - Changing Mixed Numbers to Improper Fractions

1. $2\frac{1}{8} = \frac{\quad}{8}$
2. $7\frac{1}{3} = \frac{\quad}{3}$
3. $5\frac{2}{5} = \frac{\quad}{5}$
4. $3\frac{4}{9} = \frac{\quad}{9}$
5. $12\frac{1}{2} = \frac{\quad}{2}$
6. $9\frac{1}{4} = \frac{\quad}{4}$
7. $10\frac{2}{3} = \frac{\quad}{3}$
8. $3\frac{7}{8} = \frac{\quad}{8}$
9. $4\frac{9}{10} = \frac{\quad}{10}$
10. $5\frac{1}{12} = \frac{\quad}{12}$
11. $6\frac{1}{3} = \frac{\quad}{3}$
12. $2\frac{2}{5} = \frac{\quad}{5}$
13. $7\frac{5}{6} = \frac{\quad}{6}$
14. $11\frac{1}{2} = \frac{\quad}{2}$
15. $4\frac{2}{7} = \frac{\quad}{7}$
16. $6\frac{1}{4} = \frac{\quad}{4}$
17. $3\frac{2}{3} = \frac{\quad}{3}$
18. $7\frac{7}{8} = \frac{\quad}{8}$
19. $8\frac{6}{10} = \frac{\quad}{10}$
20. $9\frac{3}{4} = \frac{\quad}{4}$

Application Problems - All packets with the exception of the Diagnostic Test (#1) and game packets include this special feature.

1. A carpenter uses $5\frac{1}{3}$ boxes of nails on one project. If 6 projects of similar size are to be completed, how many boxes of nails are needed?

2. If a beautician uses an average of 2½ dozen perm rods per customer, how many dozen rods will be needed to give 9 customers perms simultaneously?

3. If a dentist uses 1½ grams of gold in a filling, how many grams would be needed for 4 teeth?

4. If each lab tech smock requires 2½ years of material, how many smocks can be made from 30 yards of material?

5. A bus travels 87½ miles in 2¼ hours. What is the average speed?

6. A 15½ foot wire is cut into 5 equal lengths. What is the length of each piece?

7. How many business cards measuring 1¼" wide can be cut from stock 25" wide?

Here you can see the seven major vocational areas that Computer Assisted Vocational Mathematics focuses on and at least one application problem is devoted to each area.

Additional Sources - These may be used as an aid in planning and/or facilitating additional problems.

V. SKILLS NEEDED
All operations related to whole numbers. Addition, subtraction of equivalent fractions.

This part of the packet enables the teacher to focus on the skills necessary for successful completion of a packet.